TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 SYSTEM COVERAGE 1
1.2 SIX-STEP TROUBLESHOOTING PROCEDURE 1

2.0 IDENTIFICATION OF SYSTEM 1

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION 1

3.1 GENERAL DESCRIPTION 1
3.2 FUNCTION OPERATION 1
3.2.1 FUEL CONTROL 1
3.2.2 ON-BOARD DIAGNOSTICS 1
3.2.3 OTHER CONTROLS 4
3.2.4 PCM OPERATING MODES 4
3.2.5 NON-MONITORED CIRCUITS 5
3.2.6 SKIS OVERVIEW 5
3.2.7 SKIM ON-BOARD DIAGNOSTICS 5
3.2.8 SKIS OPERATION 6
3.2.9 PROGRAMMING THE POWERTRAIN CONTROL MODULE 6
3.2.10 PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE 7
3.2.11 PROGRAMMING THE IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE 7
3.3 DIAGNOSTIC TROUBLE CODES 7
3.3.1 HARD CODE 7
3.3.2 INTERMITTENT CODE 8
3.3.3 RESET COUNTER 8
3.3.4 HANDLING NO TROUBLE CODE PROBLEMS 8
3.4 USING THE DRBIII® 11
3.5 DRB ERROR MESSAGES AND BLANK SCREEN 11
3.5.1 DRB III® DOES NOT POWER UP 11
3.5.2 DISPLAY IS NOT VISIBLE 11

4.0 DISCLAIMERS, SAFETY, WARNINGS 11

4.1 DISCLAIMERS 11
4.2 SAFETY 11
4.2.1 TECHNICIAN SAFETY INFORMATION 11
4.2.2 VEHICLE PREPARATION FOR TESTING 12
4.2.3 SERVICING SUB-ASSEMBLIES 12
4.2.4 DRBIII® SAFETY INFORMATION 12
4.3 WARNINGS AND CAUTIONS 12
4.3.1 ROAD TEST WARNINGS 12
4.3.2 VEHICLE DAMAGE CAUTIONS 12
4.3.3 ELECTRONIC PINION FACTOR WARNING 13

5.0 REQUIRED TOOLS AND EQUIPMENT 13

6.0 GLOSSARY OF TERMS 13

TABLE OF CONTENTS - Continued

7.0 DIAGNOSTIC INFORMATION AND PROCEDURES 15

CHARGING

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY 16
P1478-BATTERY TEMP SENSOR VOLTS OUT OF LIMIT 18
P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH 19
P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW 19
P1594-CHARGING SYSTEM VOLTAGE TOO HIGH 22
P1682-CHARGING SYSTEM VOLTAGE TOO LOW 24
*CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT 27
*CHECKING THE AMBIENT/BATTERY TEMPERATURE SENSOR 30

COMMUNICATION

P0600-PCM FAILURE SPI COMMUNICATIONS 31
P0601-PCM INTERNAL CONTROLLER FAILURE 31
P1685-INVALID SKIM KEY 32
P1686-NO SKIM BUS MESSAGE RECEIVED 34
P1687-NO CLUSTER BUS MESSAGE 36
P1695-NO CCD/J1850 MESSAGE FROM BODY CONTROL MODULE 38
P1696-PCM FAILURE EEPROM WRITE DENIED 41
P1697-PCM FAILURE SRI MILE NOT STORED 42
P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE 44
*BUS +/- SIGNAL OPEN FROM SKIM 47
*NO RESPONSE FROM PCM (PCI BUS) 49
*NO RESPONSE FROM PCM (SCI ONLY) 51
*NO RESPONSE FROM TCM 53
*PCI BUS COMMUNICATION FAILURE 56

DRIVEABILITY

P0106-BAROMETRIC PRESSURE OUT OF RANGE 59
P0107-MAP SENSOR VOLTAGE TOO LOW 63
P0108-MAP SENSOR VOLTAGE TOO HIGH 66
P0112-INTAKE AIR TEMP SENSOR VOLTAGE LOW 69
P0113-INTAKE AIR TEMP SENSOR VOLTAGE HIGH 71
P0117-ECT SENSOR VOLTAGE TOO LOW 73
P0118-ECT SENSOR VOLTAGE TOO HIGH 75
P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP 77
P0122-THROTTLE POSITION SENSOR VOLTAGE LOW 81
P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH 84
P0125-CLOSED LOOP TEMP NOT REACHED 87
P1281-ENGINE IS COLD TOO LONG 87
P0131-1/1 O2 SENSOR SHORTED TO GROUND 89
P0137-1/2 O2 SENSOR SHORTED TO GROUND 89
P0151-2/1 O2 SENSOR SHORTED TO GROUND 89
P0157-2/2 O2 SENSOR SHORTED TO GROUND 89
P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE 92
P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE 92
P0152-2/1 O2 SENSOR SHORTED TO VOLTAGE 92
P0158-2/2 O2 SENSOR SHORTED TO VOLTAGE 92
P0133-1/1 O2 SENSOR SLOW RESPONSE 95
P0134 - 1/1 O2 SENSOR STAYS AT CENTER 95
P0139-1/2 O2 SENSOR SLOW RESPONSE 95
P0140-1/2 O2 SENSOR STAYS AT CENTER 95

TABLE OF CONTENTS - Continued

P0153-2/1 O2 SENSOR SLOW RESPONSE 95
P0154-2/1 02 SENSOR STAYS AT CENTER 95
P0160-2/2 O2 SENSOR STAYS AT CENTER 95
P0135-1/1 O2 SENSOR HEATER FAILURE 97
P0141-1/2 O2 SENSOR HEATER FAILURE 97
P0155-2/1 O2 SENSOR HEATER FAILURE 97
P0161-2/2 O2 SENSOR HEATER FAILURE 97
P0171-1/1 FUEL SYSTEM LEAN 100
P0174-2/1 FUEL SYSTEM LEAN 100
P0172-1/1 FUEL SYSTEM RICH 106
P0175-2/1 FUEL SYSTEM RICH 106
P0201-INJECTOR #1 CONTROL CIRCUIT 112
P0202-INJECTOR #2 CONTROL CIRCUIT 115
P0203-INJECTOR #3 CONTROL CIRCUIT 118
P0204-INJECTOR #4 CONTROL CIRCUIT 121
P0205-INJECTOR #5 CONTROL CIRCUIT 124
P0206-INJECTOR #6 CONTROL CIRCUIT 127
P0300-MULTIPLE CYLINDER MIS-FIRE 130
P0301-CYLINDER #1 MISFIRE 130
P0302-CYLINDER #2 MISFIRE 130
P0303-CYLINDER #3 MISFIRE 130
P0304-CYLINDER #4 MISFIRE 130
P0305-CYLINDER #5 MISFIRE 130
P0306-CYLINDER #6 MISFIRE 130
P0320-NO CRANK REFERENCE SIGNAL AT PCM 134
P0325-KNOCK SENSOR #1 CIRCUIT 141
P0340-NO CAM SIGNAL AT PCM 144
P0351-IGNITION COIL #1 PRIMARY CIRCUIT 150
P0352-IGNITION COIL #2 PRIMARY CIRCUIT 153
P0353-IGNITION COIL #3 PRIMARY CIRCUIT 156
P0354-IGNITION COIL #4 PRIMARY CIRCUIT 159
P0355-IGNITION COIL #5 PRIMARY CIRCUIT 162
P0356-IGNITION COIL #6 PRIMARY CIRCUIT 165
P0401 - EGR SYSTEM FAILURE 168
P0403 - EGR SOLENOID CIRCUIT 172
P0404 - EGR POSITION SENSOR RATIONALITY 175
P0405 - EGR POSITION SENSOR VOLTAGE TOO LOW 177
P0406 - EGR POSITION SENSOR VOLTS TOO HIGH 179
P0420-1/1 CATALYTIC CONVERTER EFFICIENCY 182
P0432-2/1 CATALYTIC CONVERTER EFFICIENCY 184
P0441-EVAP PURGE FLOW MONITOR 186
P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED 188
P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED 188
P0443-EVAP PURGE SOLENOID CIRCUIT 191
P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES 193
P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW 194
P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH 194
P0500-NO VEHICLE SPEED SIGNAL 195
P0505-IDLE AIR CONTROL MOTOR CIRCUITS 197
P0551-POWER STEERING SWITCH FAILURE 203
P0700-EATX CONTROLLER DTC PRESENT 205
P0703-BRAKE SWITCH SENSE CIRCUIT 206
*BRAKE SWITCH SENSE STATUS DOES NOT CHANGE ON DRB 206

TABLE OF CONTENTS - Continued

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR 208
P1196-2/1 O2 SENSOR SLOW DURING CATALYST MONITOR 208
P1282-FUEL PUMP RELAY CONTROL CIRCUIT. 210
P1288-SHORT RUNNER SOLENOID CIRCUIT 212
P1289-MANIFOLD TUNE VALVE CONTROL CIRCUIT 214
P1294-TARGET IDLE NOT REACHED 216
P1297-NO CHANGE IN MAP FROM START TO RUN. 218
P1299-VACUUM LEAK FOUND (IAC FULLY SEATED) 223
P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT. 225
P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM 227
P1391-INTERMITTENT LOSS OF CMP OR CKP. 230
P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT 234
P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND 236
P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT 239
P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT 241
P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT 243
P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT 245
P1496-5 VOLT SUPPLY, OUTPUT TOO LOW 247
*CHECKING BRAKE SWITCH OPERATION WITH NO DTC'S 250
*CHECKING ENGINE MECHANICAL SYSTEMS 251
*CHECKING ENGINE VACUUM 252
*CHECKING EVAPORATIVE EMISSION SYSTEM. 253
*CHECKING FUEL DELIVERY. 255
*CHECKING IAC MOTOR OPERATION WITH NO DTC'S. 258
*CHECKING MAP SENSOR OPERATION WITH NO DTC'S. 260
*CHECKING MINIMUM IDLE AIRFLOW 261
*CHECKING RADIATOR FAN OPERATION WITH NO DTC'S. 263
*CHECKING THE ENGINE COOLANT TEMPERATURE SENSOR. 265
*CHECKING THE INTAKE AIR TEMPERATURE SENSOR 266
*CHECKING THE PCM POWER AND GROUNDS. 267
*CHECKING THROTTLE POSITION SENSOR OPERATION WITH NO DTC'S. 268

HEATING & A/C
P0645-A/C CLUTCH RELAY CKT 270
P1598-A/C PRESSURE SENSOR VOLTS TOO HIGH. 272
P1599-A/C PRESSURE SENSOR VOLTS TOO LOW 274
*CHECKING A/C SYSTEM OPERATION WITH NO DTC'S 276

SPEED CONTROL
P1595-SPEED CONTROL SOLENOID CIRCUITS 278
P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT 278
P1597-SPEED CONTROL SWITCH ALWAYS LOW 285
*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT 288

STARTING
*ENGINE CRANKS DOES NOT START 297
*NO CRANK CONDITION. 304
*NO RESPONSE FROM PCM WITH A NO START CONDITION 307
*START AND STALL CONDITION 311

TRANSMISSION
P1899-P/N SWITCH STUCK IN PARK OR IN GEAR. 316
*CHECKING PARK/NETURAL SWITCH OPERATION 318

VEHICLE THEFT/SECURITY
ANTENNA FAILURE 320
COP FAILURE 320
EEPROM FAILURE 320
INTERNAL FAULTS 320
RAM FAILURE 320
SERIAL LINK INTERNAL 320
STACK OVERFLOW FAILURE 320
PCM STATUS FAILURE 321
ROLLING CODE FAILURE 321
SERIAL LINK EXTERNAL FAULT 321
TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE 323
TRANSPONDER COMMUNICATION FAILURE 323
TRANSPONDER ID MISMATCH 323
TRANSPONDER RESPONSE MISMATCH 323
VIN MISMATCH 325

VERIFICATION TESTS
VERIFICATION TESTS 327

8.0 SYSTEM COMPONENT LOCATIONS 335

8.1 Powertrain, Body and Trans Control Modules 335
8.2 CONTROLS & SOLENOIDS 335
8.3 DATA LINK CONNECTOR 337
8.4 Sensors 338
8.5 Fuel System 341
8.7 Switches 341

9.0 CONNECTOR PINOUTS 343

A/C COMPRESSOR CLUTCH - BLACK 2 WAY 343
A/C PRESSURE TRANSDUCER - GRAY 4 WAY 343
AMBIENT TEMPERATURE SENSOR - 2 WAY 343
BODY CONTROL MODULE C1 - GRAY 14 WAY 343
BODY CONTROL MODULE C2 - BLACK 24 WAY 344
BODY CONTROL MODULE C3 - WHITE 12 WAY 344
BODY CONTROL MODULE C4 - BLUE 16 WAY 344
BRAKE LAMP SWITCH - GRAY 6 WAY 345
C308 - NATURAL (BODY SIDE) 345
C308 - NATURAL (FUEL TANK JUMPER SIDE) 345
CAMSHAFT POSITION SENSOR - BLACK 3 WAY 345
CLOCKSPRING NO. 1 - NATURAL 5 WAY 346
CLOCKSPRING NO. 2 - YELLOW 2 WAY 346
COIL ON PLUG NO. 1 - BLACK 2 WAY 346
COIL ON PLUG NO. 2 - BLACK 2 WAY 346
COIL ON PLUG NO. 3 - BLACK 2 WAY 347
COIL ON PLUG NO. 4 - BLACK 2 WAY 347
COIL ON PLUG NO. 5 - BLACK 2 WAY 347
COIL ON PLUG NO. 6 - BLACK 2 WAY 347
CRANKSHAFT POSITION SENSOR (2.7L) - BLACK 3 WAY 348
CRANKSHAFT POSITION SENSOR (3.2L/3.5L) - 3 WAY 348
DATA LINK CONNECTOR - BLACK 16 WAY 348

EGR SOLENOID - BLACK 6 WAY 349
ENGINE OIL PRESSURE SWITCH - GREEN 2 WAY 349
EVAP/PURGE SOLENOID - BLACK 2 WAY 349
FUEL INJECTOR NO. 1 - BLACK 2 WAY 349
FUEL INJECTOR NO. 2 - BLACK 2 WAY 350
FUEL INJECTOR NO. 3 - BLACK 2 WAY 350
FUEL INJECTOR NO. 4 - BLACK 2 WAY 350
FUEL INJECTOR NO. 5 - BLACK 2 WAY 350
FUEL INJECTOR NO. 6 - BLACK 2 WAY 351
FUEL PUMP MODULE - GRAY 4 WAY 351
GENERATOR (2.7L) - 2 WAY 351
GENERATOR (3.2L/3.5L) - BLACK 2 WAY 351
IDLE AIR CONTROL MOTOR - BLACK 4 WAY 352
INTAKE AIR TEMPERATURE SENSOR (2.7L) - GRAY 2 WAY 352
INTAKE AIR TEMPERATURE/MANIFOLD ABSOLUTE PRESSURE SENSOR (3.2L/3.5L) 352
FUSES 354
CIRCUIT BREAKERS 354
DAYTIME RUNNING LAMP MODULE 354
DOOR LOCK RELAY 354
DOOR UNLOCK RELAY 354
DRIVER DOOR UNLOCK RELAY 355
FOG LAMP RELAY 355
HIGH BEAM HEADLAMP RELAY 355
HORN RELAY 355
LOW BEAM HEADLAMP RELAY 355
PARK LAMP RELAY 355
SPARE RELAY 355
JUNCTION BLOCK BODY CONTROL MODULE - JB 357
KNOCK SENSOR (2.7L) - GRAY 2 WAY 357
KNOCK SENSOR (3.2L/3.5L) - BLACK 2 WAY 357
LEAK DETECTION PUMP - BLACK 4 WAY 357
MANIFOLD ABSOLUTE PRESSURE SENSOR (2.7L) - BLACK 3 WAY 358
MANIFOLD TUNING VALVE - BLACK 2 WAY 358
OUTPUT SPEED SENSOR - DK BLUE 2 WAY 358
OXYGEN SENSOR 1/1 RIGHT BANK UP - BLACK 4 WAY 358
OXYGEN SENSOR 1/2 RIGHT BANK DOWN - BLACK 4 WAY 359
OXYGEN SENSOR 2/1 LEFT BANK UP - BLACK 4 WAY 359
OXYGEN SENSOR 2/2 LEFT BANK DOWN - BLACK 4 WAY 359
FUSES 361
A/C COMPRESSOR CLUTCH RELAY 361
AUTOMATIC SHUT DOWN RELAY 361
ENGINE STARTER MOTOR RELAY 361
FUEL PUMP RELAY 361
HEADLAMP WASHER RELAY (BUILT-UP-EXPORT) 361
HIGH SPEED RADIATOR FAN RELAY 362
LOW SPEED RADIATOR FAN RELAY 362
REAR FOG LAMP RELAY (BUILT-UP-EXPORT) 362
TRANSMISSION CONTROL RELAY 362
WIPER HIGH/LOW RELAY 362
WIPER ON/OFF RELAY 362
POWER STEERING PRESSURE SWITCH - GRAY 2 WAY 363
POWERTRAIN CONTROL MODULE C1 - 40 WAY 363

POWERTRAIN CONTROL MODULE C2 - GRAY 40 WAY. 364
RADIATOR FAN MOTOR ASSEMBLY - 4 WAY 364
SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY 365
SHORT RUNNER VALVE SOLENOID (3.2L/3.5L) - DK BLUE 2 WAY 365
THROTTLE POSITION SENSOR (2.7L) - BLACK 3 WAY 365
THROTTLE POSITION SENSOR (3.2L/3.5L) - NATURAL 3 WAY. 365
TRANSMISSION CONTROL MODULE - BLACK 60 WAY 366
TRANSMISSION RANGE SENSOR - LT. GREEN 10 WAY 367
TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY - BLACK 8 WAY . .367
VEHICLE SPEED CONTROL SERVO - BLACK 4 WAY. 367

10.0 SCHEMATIC DIAGRAMS. 369

10.1 ENGINE CONTROLS (2000) 369

NOTES

1.0 INTRODUCTION

The procedures contained in this manual include specifications, instructions, and graphics needed to diagnose the PCM Powertrain System. The diagnostics in this manual are based on the failure condition or symptom being present at time of diagnosis.

Please follow the recommendations below when choosing your diagnostic path.

1. First make sure the DRBIII® is communicating with the appropriate modules; ie., if the DRBIII® displays a "No Response" condition, you must diagnose this first before proceeding.
2. Read DTC's (diagnostic trouble codes) with the DRBIII®.
3. If no DTC's are present, identify the customer complaint.
4. Once the DTC or customer complaint is identified, locate the matching test in the Table of Contents and begin to diagnose the symptom.

All component location views are in Section 8.0. All connector pinouts are in Section 9.0. All system schematics are in Section 10.0.

An * placed before the symptom description indicates a customer complaint.

When repairs are required, refer to the appropriate service manual for the proper removal and repair procedure.

Diagnostic procedures change every year. New diagnostic systems may be added; carryover systems may be enhanced. READ THIS MANUAL BEFORE TRYING TO DIAGNOSE A VEHICLE CODE. It is recommended that you review the entire manual to become familiar with all new and changed diagnostic procedures.

After using this book, if you have any comments or recommendations, please fill out the form at the back of the book and mail it back to us.

1.1 SYSTEM COVERAGE

This diagnostic procedures manual covers the following 2000 Chrysler 300M equipped with a 2.7L or 3.5L engine.

1.2 SIX-STEP TROUBLESHOOTING PROCEDURE

Diagnosis of the powertrain control module (PCM) is done in six basic steps:

- verification of complaint
- verification of any related symptoms
- symptom analysis
- problem isolation
- repair of isolated problem
- verification of proper operation

2.0 IDENTIFICATION OF SYSTEM

The Powertrain Control Module (PCM) monitors and controls:

- Fuel system
- Ignition system
- charging system
- speed control system
- cooling system

3.0 SYSTEM DESCRIPTION AND FUNCTIONAL OPERATION

3.1 GENERAL DESCRIPTION

These Sequential Fuel Injection (SFI) engine systems have the latest in technical advances. The Euro Stage 3 On-Board Diagnostics incorporated with the powertrain control module (PCM) are intended to assist the field technician in repairing vehicle problems by the quickest means.

3.2 FUNCTION OPERATION

3.2.1 FUEL CONTROL

The PCM controls the air/fuel ratio of the engine by varying fuel injector on time. Mass air flow is calculated using the speed density method using engine speed, manifold absolute pressure, and air temperature change.

Different fuel calculation strategies are used dependent on the operational state of the engine. During crank mode, a prime shot fuel pulse is delivered followed by fuel pulses determined by a crank time strategy. Cold engine operation is determined via an open loop strategy until the O2 sensors have reached operating temperature. At this point, the strategy enters a closed loop mode where fuel requirements are based upon the state of the O2 sensors, engine speed, MAP, throttle position, air temperature, battery voltage, and coolant temperature.

3.2.2 ON-BOARD DIAGNOSTICS

The PCM has been programmed to monitor many different circuits of the fuel injection system. This monitoring is called "on-board diagnosis."

Certain criteria, or “arming conditions,” must be met for a trouble code to be entered into the PCM memory. The criteria may be a range of: engine rpm, engine temperature, and/or input voltage to the PCM. If a problem is sensed with a monitored circuit, and all of the criteria or arming conditions are met, then a trouble code will be stored in the PCM.

It is possible that a trouble code for a monitored circuit may not be entered into the PCM memory even though a malfunction has occurred. This may happen because one of the trouble code criteria (arming conditions) have not been met.

The PCM compares input signal voltages from each input device with specifications (the established high and low limits of the range) that are programmed into it for that device. If the input voltage is not within specifications and other trouble code criteria (arming conditions) are met, a trouble code will be stored in the PCM memory.

The On Board Diagnostics have evolved to a new Generation of Diagnostics referred to as Euro Stage 3 On-Board Diagnostics

The following table summarizes the various OBDII monitors operation.

Euro Stage III OBD MONITOR INFORMATION

Comprehensive Components Monitor	**Major Monitors Non Fuel Control & Non Misfire**	**Major Monitors Fuel Control & Misfire**
Run constantly	Run Once Per Trip	Run Constantly
Includes All Engine Hardware - Sensors, Switches, Solenoids, etc.	Monitors Entire Emission System	Monitors Entire System
One Trip Faults - Turns On The MIL and Sets DTC After One Failure (except for most rationality tests which are two trip)	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures	Two Trip Faults - Turns On The MIL and Sets DTC After Two Consecutive Failures
Priority 3	**Priority 1 or 3**	**Priority 2 or 4**
All Checked For Continuity Open Short To Ground Short To Voltage	Done Stop Testing = Yes Oxygen Sensor Heater Oxygen Sensor Response	**Fuel Control Monitor** Monitors Fuel Control System For: Fuel System Lean Fuel System Rich Requires 3 Consecutive *Fuel System Good Trips* To Extinguish The MIL
Inputs Checked For Rationality	Catalytic Converter Efficiency Except EWMA - up to 6 tests per trip and a one trip fault	
Outputs Checked For Functionality	EGR System Evaporative Emission System	**Misfire Monitor** Monitors For Engine Misfire at: 1000 RPM Counter (Type B) **200 RPM Counter (Type A) Requires 3 Consecutive *Misfire Good Trips* To Extinguish the MIL **Type A misfire is a one trip failure. The MIL will illuminate and blink at the first failure.
Requires 3 Consecutive *Global/Alternate Good Trips* to Extinguish the MIL*	Requires 3 Consecutive *Global Good Trips* to Extinguish the MIL*	

***40 Warm Up Cycles** are required to erase DTC's *after* the MIL has been extinguished.

3.2.3 OTHER CONTROLS

CHARGING SYSTEM

The charging system is turned on when the engine is started and ASD relay energized. When the ASD relay is on, ASD output voltage is supplied to the ASD sense circuit at the PCM. This voltage is connected in some cases, through the PCM and supplied to one of the generator field terminals (Gen Source +). All others, the Gen field is connected directly to the ASD output voltage. The amount of current produced by the generator is controlled by the Electronic Voltage Regulator (EVR) circuitry, in the PCM. A battery temperature sensor, located either in the battery tray, using the ambient sensor, or in the PCM itself, is used to sense battery temperature. This temperature along with sensed line voltage, is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to the other generator field terminal (Gen field driver).

SPEED CONTROL SYSTEM

The PCM controls vehicle speed by operation of the speed control servo vacuum and vent solenoids. Energizing the vacuum solenoid applies vacuum to the servo to increase throttle position. Operation of the vent solenoid slowly releases the vacuum allowing throttle position to decrease. A special dump solenoid allows immediate release of throttle position caused by braking, cruise control switch turned off, shifting into neutral, excessive RPM (tires spinning) or ignition key off.

3.2.4 PCM OPERATING MODES

As input signals to the powertrain control module (PCM) change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for wide open throttle. There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two types of engine control operation: **open loop** and **closed loop.**

In open loop operation, the PCM receives input signals and responds according to preset programming. Inputs from the heated oxygen sensors are not monitored.

In closed loop operation, the PCM monitors the inputs from the heated oxygen sensors. This input indicates to the PCM whether or not the calculated injector pulse width results in the ideal air-fuel ratio of 14.7 parts air to 1 part fuel. By monitoring the exhaust oxygen content through the oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve the lowest emission levels while maintaining optimum fuel economy.

The engine start-up (crank), engine warm-up, and wide open throttle modes are open loop modes. Under most operating conditions, closed loop modes occur with the engine at operating temperature.

IGNITION SWITCH ON (ENGINE OFF) MODE

When the ignition switch activates the fuel injection system, the following actions occur:

1. The PCM determines atmospheric air pressure from the MAP sensor input to determine basic fuel strategy.
2. The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM modifies fuel strategy based on this input.

When the key is in the “on” position and the engine is not running (zero rpm), the auto shutdown relay and fuel pump relay are not energized. Therefore, voltage is not supplied to the fuel pump, ignition coil, and fuel injectors.

Engine Start-up Mode - This is an open loop mode. The following actions occur when the starter motor is engaged:

1. The auto shutdown and fuel pump relays are energized. If the PCM does not receive the camshaft and crankshaft signal within approximately one second, these relays are de-energized.
2. The PCM energizes all fuel injectors until it determines crankshaft position from the camshaft and crankshaft signals. The PCM determines crankshaft position within one engine revolution. After the crankshaft position has been determined, the PCM energizes the fuel injectors in sequence. The PCM adjusts the injector pulse width and synchronizes the fuel injectors by controlling the fuel injectors' ground paths.
3. Once the engine idles within 64 rpm of its target engine speed, the PCM compares the current MAP sensor value with the value received during the ignition switch on (zero rpm) mode. A diagnostic trouble code is written to PCM memory if a minimum difference between the two values is not found.

Once the auto shutdown and fuel pump relays have been energized, the PCM determines the fuel injector pulse width based on the following:

- engine coolant temperature
- manifold absolute pressure
- intake air temperature
- engine revolutions
- throttle position

The PCM determines the spark advance based on the following:

- engine coolant temperature
- crankshaft position
- camshaft position
- intake air temperature
- manifold absolute pressure
- throttle position

Engine Warm-Up Mode - This is an open loop mode. The PCM adjusts injector pulse width and controls injector synchronization by controlling the fuel injectors' ground paths. The PCM adjusts ignition timing and engine idle speed. The PCM adjusts the idle speed by controlling the idle air control motor and spark advance.

Cruise or Idle Mode - When the engine is at normal operating temperature, this is a closed loop mode.

Acceleration Mode - This is a closed loop mode. The PCM recognizes an increase in throttle position and a decrease in manifold vacuum as engine load increases. In response, the PCM increases the injector pulse width to meet the increased load. The A/C compressor may be de-energized for a short period of time.

Deceleration - This is a closed loop mode. The PCM recognizes a decrease in throttle position and an increase in manifold vacuum as engine load decreases. In response, the PCM decreases the injector pulse width to meet the decreased load. Full injector shut off may be obtained during high speed deceleration.

Wide Open Throttle Mode - This is an open loop mode. The throttle position sensor notifies the PCM of a wide open throttle condition. Once a wide open throttle is sensed, the PCM de-energizes the A/C compressor clutch relay for 15 seconds.

3.2.5 NON-MONITORED CIRCUITS

The PCM does not monitor the following circuits, systems, and conditions even though they could have malfunctions that result in driveability problems. A diagnostic code may not be displayed for the following conditions. However, problems with these systems may cause a diagnostic code to be displayed for other systems. For example, a fuel pressure problem will not register a diagnostic code directly, but could cause a rich or lean condition. This could cause an oxygen sensor, fuel system, or misfire monitor trouble code to be stored in the PCM.

Engine Timing - The PCM cannot detect an incorrectly indexed timing chain, camshaft sprocket, or crankshaft sprocket. The PCM also cannot detect an incorrectly indexed distributor.(*)

Fuel Pressure - Fuel pressure is controlled by the fuel pressure regulator. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line filter, or a pinched fuel supply.(*)

Fuel Injectors - The PCM cannot detect if a fuel injector is clogged, the pintle is sticking, or the wrong injectors are installed.(*)

Fuel Requirements - Poor quality gasoline can cause problems such as hard starting, stalling, and stumble. Use of methanol-gasoline blends may result in starting and driveability problems. See individual symptoms and their definitions in Section 6.0 (Glossary of Terms)

PCM Grounds - The PCM cannot detect a poor system ground. However, a diagnostic trouble code may be stored in the PCM as a result of this condition.

Throttle Body Air Flow - The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.(*)

Exhaust System - The PCM cannot detect a plugged, restricted, or leaking exhaust system.(*)

Cylinder Compression - The PCM cannot detect uneven, low, or high engine cylinder compression.(*)

Excessive Oil Consumption - Although the PCM monitors the exhaust stream oxygen content through the oxygen sensor when the system is in a closed loop, it cannot determine excessive oil consumption.

(*)NOTE: ANY OF THESE CONDITIONS COULD RESULT IN A RICH OR LEAN CONDITION CAUSING AN OXYGEN SENSOR TROUBLE CODE TO BE STORED IN THE PCM, OR THE VEHICLE MAY EXHIBIT ONE OR MORE OF THE DRIVEABILITY SYMPTOMS LISTED IN THE TABLE OF CONTENTS.

3.2.6 SKIS OVERVIEW

The Sentry Key Immobilizer System (SKIS) is an immobilizer system design to prevent unauthorized vehicle operation. The system consists of a Sentry Key Immobilizer Module (SKIM), ignition key(s) equipped with a transponder chip and engine controller. When the ignition switch is turned on, the SKIM interrogates the ignition key. If the ignition key is "Valid", the SKIM sends a PCI Bus message to the engine controller indicating the presence of a valid igntion key. Upon receiving a "Valid" key signal the PCM will allow the engine to continue to operate.

3.2.7 SKIM ON-BOARD DIAGNOSTICS

The SKIM has been programmed to transmit and monitor many different coded messages as well as PCI Bus messages. This monitoring is called "On Board Diagnosis".

Certain criteria must be met for a diagnostic trouble code to be entered into the SKIM memeory. The criteria may be a range of; Input voltage, PCI Bus message, or coded messages to the SKIM. If all of the criteria for monitoring a circuit or function are met and a fault is sensed, a diagnostic trouble code will be stored in the SKIM memory.

3.2.8 SKIS OPERATION

When ignition power is supplied to the SKIM, the SKIM performs an internal self-test. After the self-test is completed, the SKIM neergizes the antenna (this activates the transponder chop responds to the challenge by generating an encrypted response message using the following:

Secret Key - This is an electronically stored value (identification number) that is unique to each SKIS. The secret key is stored in the SKIM, PCM and all ignition key tranponders.

Challenge - This is a random numbr that is generated by the SKIM at each ignition key cycle.

The secret key and challenge are plugged into an algorithm that produces the encrypted response message. The transponder uses the crypto algorithm to receive, decode and respond to the message sent by the SKIM. After responding to the coded message, the transponder sends a transponder ID message to the SKIM. The SKIM compares the transponder ID to the available valid key codes in the SKIM memory (8 key maximum). After validating the key the SKIM sends a PCI Bus message called a "Seed Request" to the engine controller then waits for a PCM response. If the PCM does not respond, the SKIM will send the seed request again. After three failed attempts the SKIM will stop sending the seed request and store a trouble code. If the PCM sends a seed response, the SKIM sends a valid/invalid key message to the PCM. This is an encrypted message that is generated using the following:

VIN - Vehicle Identification Number

Seed - This is a random number that is generated by the PCM at each ignition key cycle.

The VIN and seed are plugged into a rolling code algorithm that encrypts the "valid/invalid key" message. The PCM uses the rolling code algorithm to receive, decode and respond to the valid/invalid key message sent by the SKIM. After sending the valid/invalid key massage the SKIM waits 3.5 seconds for a PCM status message from the PCM. If the PCM does not respond with a valid key message to the SKIM, a fault is detected and a trouble code is stored.

The SKIS incorporates a warning lamp located on the instrument panel upper cover. The lamp receives switched ignition voltage and is hardwired to the body control module. The lamp is actuated when the SKIM sends a PCI Bus message to the body controller requesting the lamp on. The body controller then provides the ground for the lamp. The SKIM will request lamp operation for the following:

- bulb checks at ignition on
- to alert the vehicle operator to a SKIS malfunction

For all faults except transponder faults and VIN mismatch, the lamp remains on steady. In the event of a tranponder fault the light flashes at a rate of 1 Hz (once per second). If a fault is present the lamp will remain on or flashing for the complete ignition cycle. If a fault is stored in SKIM memory which prevents the system form operating properly, the PCM will allow the engine to start and run (for 2 seconds) up to six times. After the sixth attempt, the PCM disables the starter relay until the fault is corrected.

3.2.9 PROGRAMMING THE POWERTRAIN CONTROL MODULE

Important Note: Before replacing the PCM for a failed driver, control circuit or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM driver/control circuit failures are caused by internal failure to components (i.e. 12-volt pull-ups, drivers and ground sensors). These failures are difficult to detect when a double fault has occurred and only one DTC has set.

NOTE: IF THE PCM AND THE SKIM ARE REPLACED AT THE SAME TIME, PROGRAM THE VIN INTO THE PCM FIRST. ALL VEHICLE KEYS WILL THEN NEED TO BE REPLACED AND PROGRAMMED TO THE NEW SKIM.

The SKIS "Secret Key" is an ID code that is unique to each SKIS. This code is programmed and stored in the SKIM, engine controller and transponder ship (ignition key). When replacing the PCM it is necessary to program the secret key into the PCM.

1. Turn the ignition on (transmission in park/neutral).
2. Use the DRB and select "THEFT ALARM", SKIM then MISCELLANEOUS".
3. Select "PCM REPLACED".
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: IF THREE ATTEMPTS ARE MADE TO ENTER THE SECURE ACCESS MODE USING AN INCORRECT PIN, SECURED ACCESS MODE WILL BE LOCKED OUT FOR ONE HOUR. TO EXIT THIS LOCKOUT MODE, TURN THE IGNITION TO THE RUN POSITION FOR ONE HOUR THEN ENTER THE CORRECT PIN. (ENSURE ALL ACCESSORIES ARE TURNED OFF. ALSO MONITOR THE BATTERY STATE AND CONNECT A BATTERY CHARGER IF NECESSARY).

5. Press "ENTER" to transfer the secret key (the SKIM will send the secret key to the PCM).

3.2.10 PROGRAMMING THE SENTRY KEY IMMOBILIZER MODULE

NOTE: IF THE PCM AND THE SKIM ARE REPLACED AT THE SAME TIME, PROGRAM THE VIN INTO THE PCM FIRST. ALL VEHICLE KEYS WILL THEN NEED TO BE REPLACED AND PROGRAMMMED TO THE NEW SKIM.

1. Turn the ignition on (transmission in park/ neutral).
2. Use the DRB and select "THEFT ALARM", "SKIM" then MISCELLLANEOUS.
3. Select "SKIM MOSULE REPLACEMENT (GASOLINE)"
4. Program the vehicle four-digit PIN into the SKIM.
5. Select "COUNTRY CODE" and enter the correct country.

NOTE: BE SURE TO ENTER THE CORRECT COUNTRY CODE. IF THE INCORRECT COUNTRY CODE IS PROGRAMMED INTO SKIM, THE SKIM MUST BE REPLACED.

6. Select "UPDATE VIN" (the SKIM will learn the VIN from the PCM).
7. Press "ENTER" to transfer the VIN (the PCM will send the VIN to the SKIM).
8. The DRB will ask if you want to transfer the secret key. Select "ENTER" to transfer secret key from the PCM. This will ensure the current vehicle ignition keys will still operate the SKIS system.

3.2.11 PROGRAMMING THE IGNITION KEYS TO THE SENTRY KEY IMMOBILIZER MODULE

1. Turn the ignition on (transmission in park/ neutral).
2. Use the DRB and select "THEFT ALARM", "SKIM" then "MISCELLANEOUS".
3. Select "PROGRAM IGNITION KEYS".
4. Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: A MAXIMUM OF EIGHT KEYS CAN BE LEARNED TO EACH SKIM. ONCE A KEY IS LEARNED TO A SKIM IT (THE KEY) CANNOT BE RANFERRED TO ANOTHER VEHICLE.

If ignition key programming is unsuccessful, the DRB will display one of the following messages:

Programming Not Attempted - The DRB attempts to read the programmed key status and there are no keys programmmed in the SKIM memory.

Programming Key Failed - (Possible Used Key From Wrong Vehicle) - SKIM is unable to program key due to one of the following:

- faulty ignition key transponder
- ignition key is programmed to another vehicle.

8 Keys Already Learned, Programming Not Done - SKIM transponder ID memory is full.

1. Obtain ignition keys to be programmed from customer (8 keys maximum)
2. Using the DRB, erase all ignition keys by selecting "MISCELLANEOUS" and "ERASE ALL CURRENT IGN. KEYS"
3. Program all ignition keys.

Learned Key In Ignition - Ignition key transponder ID is currently programmed in SKIM memory.

3.3 DIAGNOSTIC TROUBLE CODES

Each diagnostic trouble code is diagnosed by following a specific testing procedure. The diagnostic test procedures contain step-by-step instructions for determining the cause of trouble codes as well as no trouble code problems. It is not necessary to perform all of the tests in this book to diagnose an individual code.

Always begin by reading the diagnostic trouble codes using the DRBIII®.

3.3.1 HARD CODE

A diagnostic trouble code that comes back within one cycle of the ignition key is a "hard" code. This means that the defect is there every time the powertrain control module checks that circuit or function. Procedures in this manual verify if the trouble code is a hard code at a the beginning of each test. When it is not a hard code, an "intermittent" test must be performed.

Codes that are for Euro Stage III OBD monitors will not set with just the ignition key on. Comparing these

to non-emission codes, they will seem like an intermittent. These codes require a set of parameters to be performed (The DRBIII® pre-test screens will help with this for MONITOR codes), this is called a "TRIP". All OBDII DTCs will be set after one or in some cases two trip failures, and the MIL will be turned on. These codes require three successful (no failures) TRIPS to extinguish the MIL, followed by 40 warm-up cycles to erase the code. For further explanation of TRIPS, Pre-test screens, Warm-up cycles, and the use of a the DRBIII®, refer to the On Board Diagnostic training booklet #81-699-97094.

3.3.2 INTERMITTENT CODE

A diagnostic trouble code that is not there every time the PCM checks the circuit is an "intermittent" code. Most intermittent codes are caused by wiring or connector problems. Defects that come and go like this are the most difficult to diagnose; they must be looked for under specific conditions that cause them. The following checks may assist you in identifying a possible intermittent problem:

- Visually inspect related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.
- Visually inspect the related harnesses. Look for chafed, pierced, or partially broken wire.
- Refer to any Hotline Newsletters or technical service bulletins that may apply.
- Use the DRBIII® data recorder or co-pilot.
- Use the DRBIII® PEP module lab scope.

3.3.3 RESET COUNTER

The reset counter counts the number of times the vehicle has been started since codes were last set, erased, or the battery was disconnected. The reset counter will count up to 255 start counts.

The number of starts helps determine when the trouble code actually happened. This is recorded by the PCM and can be viewed on the DRBIII® as STARTS since set.

When there are no trouble codes stored in memory, the DRBIII® will display "NO DTC'S Detected" and the reset counter will show "STARTS since clear = XXX."

3.3.4 HANDLING NO TROUBLE CODE PROBLEMS

Symptom checks cannot be used properly unless the driveability problem characteristic actually happens while the vehicle is being tested.

Select the symptom that most accurately describes the vehicle's driveability problem and then perform the test routine that pertains to this symptom. Perform each routine test in sequence until the problem is found. For definitions, see Section 6.0 Glossary of Terms.

SYMPTOM	DIAGNOSTIC TEST
HARD START	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING ENGINE VACUUM
	CHECKING THE FUEL PRESSURE
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING ENGINE MECHANICAL SYSTEMS
	CHECKING EVAP EMISSION SYSTEM
	CHECKING EGR SYSTEM
	CHECKING IAT SENSOR
START AND STALL	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING THE FUEL PRESSURE
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING IDLE AIR CONTROL MOTOR OPERATION

HESITATION/ SAG/ STUMBLE	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING ENGINE VACUUM
	CHECKING THE FUEL PRESSURE
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING FOR OXYGEN SENSOR SWITCHING
	CHECKING O2S HEATER
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING ENGINE MECHANICAL SYSTEMS
	CHECKING EVAP EMISSION SYSTEM
	CHECKING EGR SYSTEM
	CHECKING IAT SENSOR
	CHECKING PNP SWITCH
SURGE	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING THE FUEL PRESSURE
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING FOR OXYGEN SENSOR SWITCHING
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING EVAP EMISSION SYSTEM
LACK OF POWER/ SLUGGISH	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING THE FUEL PRESSURE
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING FOR OXYGEN SENSOR SWITCHING
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING EGR SYSTEM
SPARK KNOCK/ DETONATION	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING THE FUEL PRESSURE
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING FOR OXYGEN SENSOR SWITCHING

	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING EVAP EMISSION SYSTEM
CUTS OUT/ MISSES	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING THE FUEL PRESSURE
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING FOR OXYGEN SENSOR SWITCHING
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING EGR SYSTEM
BACKFIRE/ POPBACK	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING THE FUEL PRESSURE
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING FOR OXYGEN SENSOR SWITCHING
	CHECKING EGR SYSTEM
RUNS ROUGH/ UNSTABLE/ ERRATIC IDLE	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING ENGINE VACUUM
	CHECKING THE FUEL PRESSURE
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING FOR OXYGEN SENSOR SWITCHING
	CHECKING O2S HEATER
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING ENGINE MECHANICAL SYSTEMS
	CHECKING EVAP EMISSION SYSTEM
	CHECKING EGR SYSTEM
	CHECKING IAT SENSOR
	CHECKING PNP SWITCH
POOR FUEL ECONOMY	CHECKING SECONDARY IGNITION SYSTEM
	CHECKING PCM POWER AND GND CKT
	CHECKING ENGING VACUUM
	CHECKING THE FUEL PRESSURE
	CHECKING COOLANT SENSOR CALIBRATION
	CHECKING THROTTLE POSITION SENSOR CALIBRATION
	CHECKING MAP SENSOR CALIBRATION
	CHECKING THE MINIMUM IDLE AIR FLOW
	CHECKING FOR OXYGEN SENSOR SWITCHING
	CHECKING O2S HEATER
	CHECKING IDLE AIR CONTROL MOTOR OPERATION
	CHECKING ENGINE MECHANICAL SYSTEMS

CHECKING EVAP EMISSION SYSTEM

CHECKING EGR SYSTEM

CHECKING IAT SENSOR

CHECKING PNP SWITCH

3.4 USING THE DRBIII®

Refer to the DRBIII® user's guide for instructions and assistance with reading trouble codes, erasing trouble codes, and other DRBIII® functions.

3.5 DRB ERROR MESSAGES AND BLANK SCREEN

Under normal operation, the DRBIII® will display one of only two error messages:

– User-Requested WARM Boot or User-Requested COLD Boot

This is a sample of such an error message display:

```
ver: 2.14
date: 26 Jul93
file: key_itf.cc
date: Jul 26 1993
line: 548
err: 0x1
User-Requested COLD Boot

Press MORE to switch between this display
   and the application screen.
Press F4 when done noting information.
```

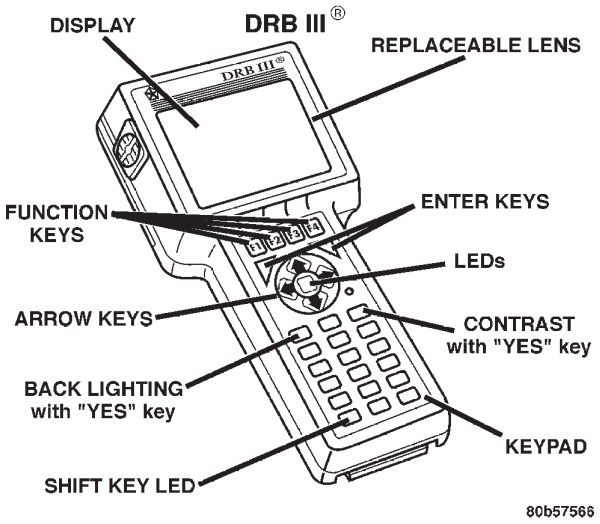
3.5.1 DRB III® DOES NOT POWER UP

If the LED's do not light or no sound is emitted at start up, check for loose cable connections or a bad cable. Check the vehicle battery voltage (data link connector cavity 16). A minimum of 11 volts is required to adequately power the DRBIII®.

If all connections are proper between the DRBIII® and vehicle or other devices, and the vehicle battery is fully charged, an inoperative DRBIII® may be the result of a faulty cable or vehicle wiring. For a blank screen, refer to the appropriate body diagnostics manual.

3.5.2 DISPLAY IS NOT VISIBLE

Low temperatures will affect the visibility of the display. Adjust the contrast to compensate for this condition.



4.0 DISCLAIMERS, SAFETY, WARNINGS

4.1 DISCLAIMERS

All information, illustrations, and specifications contained in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

4.2 SAFETY

4.2.1 TECHNICIAN SAFETY INFORMATION

WARNING: ENGINES PRODUCE CARBON MONOXIDE THAT IS ODORLESS, CAUSES SLOWER REACTION TIME, AND CAN LEAD TO SERIOUS INJURY. WHEN THE ENGINE IS OPERATING, KEEP SERVICE AREAS WELL VENTILATED OR ATTACH THE VEHICLE EXHAUST SYSTEM TO THE SHOP EXHAUST REMOVAL SYSTEM.

Set the parking brake and block the wheels before testing or repairing the vehicle. It is especially important to block the wheels on front-wheel drive vehicles; the parking brake does not hold the drive wheels.

When servicing a vehicle, always wear eye protection, and remove any metal jewelry such as watchbands or bracelets that might make an inadvertent electrical contact.

When diagnosing a powertrain system problem, it is important to follow approved procedures where applicable. These procedures can be found in service manual procedures. Following these procedures is very important to the safety of individuals performing diagnostic tests.

4.2.2 VEHICLE PREPARATION FOR TESTING

Make sure the vehicle being tested has a fully charged battery. If it does not, false diagnostic codes or error messages may occur.

4.2.3 SERVICING SUB-ASSEMBLIES

Some components of the powertrain system are intended to be serviced in assembly only. Attempting to remove or repair certain system subcomponents may result in personal injury and/or improper system operation. Only those components with approved repair and installation procedures in the service manual should be serviced.

4.2.4 DRBIII® SAFETY INFORMATION

WARNING: EXCEEDING THE LIMITS OF THE DRB MULTIMETER IS DANGEROUS. IT CAN EXPOSE YOU TO SERIOUS INJURY. CAREFULLY READ AND UNDERSTAND THE CAUTIONS AND THE SPECIFICATION LIMITS.

Follow the vehicle manufacturer's service specifications at all times.

- Do not use the DRBIII® if it has been damaged.
- Do not use the test leads if the insulation is damaged or if metal is exposed.
- To avoid electrical shock, do not touch the test leads, tips or the circuit being tested.
- Choose the proper range and function for the measurement. Do not try voltage or current measurements that may exceed the rated capacity.
- Do not exceed the limits shown in the table below:

FUNCTION	INPUT LIMIT
Volts	0 - 500 peak volts AC 0 - 500 volts DC
Ohms (resistance)*	0 -1.12 megohms
Frequency Measured Frequency Generated	0 - 10 kHz
Temperature	-58 - 1100°F -50 - 600°C

* Ohms cannot be measured if voltage is present. Ohms can be measured only in a non-powered circuit.

- Voltage between any terminal and ground must not exceed 500v DC or 500v peak AC.
- Use caution when measuring voltage above 25v DC or 25v AC.
- The circuit being tested must be protected by a 10A fuse or circuit breaker.
- Use the low current shunt to measure circuits up to 10A. Use the high current clamp to measure circuits exceeding 10A.
- When testing for the presence of voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- When measuring current, connect the meter in series with the load.
- Disconnect the live test lead before disconnecting the common test lead.
- When using the meter function, keep the DRB away from spark plug or coil wires to avoid measuring error from outside interference.

4.3 WARNINGS AND CAUTIONS

4.3.1 ROAD TEST WARNINGS

Some complaints will require a test drive as part of the repair verification procedure. The purpose of the test drive is to try to duplicate the diagnostic code or symptom condition.

CAUTION: BEFORE ROAD TESTING A VEHICLE, BE SURE THAT ALL COMPONENTS ARE REASSEMBLED. DURING THE TEST DRIVE, DO NOT TRY TO READ THE DRB SCREEN WHILE IN MOTION. DO NOT HANG THE DRB FROM THE REAR VIEW MIRROR OR OPERATE IT YOURSELF. HAVE AN ASSISTANT AVAILABLE TO OPERATE THE DRB.

4.3.2 VEHICLE DAMAGE CAUTIONS

Before disconnecting any control module, make sure the ignition is "off". Failure to do so could damage the module.

When testing voltage or continuity at any control module, use the terminal side (not the wire end) of the connector. Do not probe a wire through the insulation; this will damage it and eventually cause it to fail because of corrosion.

Be careful when performing electrical tests so as to prevent accidental shorting of terminals. Such mistakes can damage fuses or components. Also, a second code could be set, making diagnosis of the original problem more difficult.

4.3.3 ELECTRONIC PINION FACTOR WARNING

The pinion factor must be set for all new transmission control modules. If the pinion factor is not set or if it is set incorrectly, any speed-related accessories will not operate or will operate inaccurately. This includes the speedometer, speed control, rolling door locks, and other devices that are operated by the powertrain and body control modules. For instructions on setting the pinion factor, see the appropriate transmission diagnostic manual or the service manual.

5.0 REQUIRED TOOLS AND EQUIPMENT

DRBIII® (diagnostic readout box) scan tool
Evaporative System Diagnostic Kit #6917
fuel filler adapter #6922
fuel pressure adapter (C-6631) or #6539
fuel pressure kit (C-4799-B) or #5069
fuel release hose (C-4799-1)
MinAir flow fitting #6457
jumper wires
ohmmeter
oscilloscope
vacuum gauge
voltmeter
12 volt test light minimum 25 ohms resistance with probe #8382

CAUTION: A 12 VOLT TEST LIGHT SHOULD NOT BE USED FOR THE FOLLOWING CIRCUITS, DAMAGE TO THE POWERTRAIN CONTROLLER WILL OCCUR.

- 5 Volt Supply
- 8 Volt Supply
- J1850 PCI Bus
- CCD Bus
- CKP Sensor Signal
- CMP Sensor Signal
- Vehicle Speed Sensor Signal
- O2 Sensor Signal

6.0 GLOSSARY OF TERMS

ABS	antilock brake system
backfire, popback	fuel ignites in either the intake or the exhaust system
CKP	crank position sensor
CMP	camshaft position sensor
cuts out, misses	a steady pulsation or the inability of the engine to maintain a consistent rpm
DLC	data link connector (previously called “engine diagnostic connector”)
detonation, spark knock	a mild to severe ping, especially under loaded engine conditions
ECT	engine coolant temperature sensor
EGR	exhaust gas recirculation valve and system
generator	previously called “alternator”
hard start	The engine takes longer than usual to start, even though it is able to crank normally.
hesitation, sag, stumble	There is a momentary lack of response when the throttle is opened. This can occur at all vehicle speeds. If it is severe enough, the engine may stall.
IAT	intake air temperature sensor
IAC	idle air control valve
JTEC	Combined engine and transmission control module
lack of power, sluggish	The engine has less than expected power, with little or no increase in vehicle speed when the throttle is opened.
LDP	Leak Detection Pump
MAP	manifold absolute pressure sensor
MIL	malfunction indicator lamp
MTV	manifold tuning valve
O2S	oxygen sensor
PCI	Programmable Communication Interface
PCM	powertrain control module
PCM	powertrain control module
PCV	positive crankcase ventilation
PEP	Peripheral Expansion Port
poor fuel economy	There is significantly less fuel mileage than other vehicles of the same design and configuration

rough, unstable, or erratic idle stalling	The engine runs unevenly at idle and causes the engine to shake if it is severe enough. The engine idle rpm may vary (called “hunting”). This condition may cause stalling if it is severe enough.
SKIM	Sentry Key Immobilizer
SKIS	Sentry Key Immobilizer System
start and stall	The engine starts but immediately dies.
surge	engine rpm fluctuation without corresponding change in throttle position sensor
TPS	throttle position sensor
TRS	transmission range sensor
VSS	vehicle speed sensor/signal

7.0

DIAGNOSTIC INFORMATION AND PROCEDURES

Symptom:

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY

When Monitored and Set Condition:

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY

When Monitored: With the ignition key on and the engine running.

Set Condition: When the PCM tries to regulate the generator field with no result during monitoring.

POSSIBLE CAUSES
GENERATOR FIELD WIRING HARNESS INTERMITTENT PROBLEM
GENERATOR FIELD WIRING HARNESS OBSERVABLE PROBLEM
ASD RELAY OUTPUT CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD RESISTANCE >= 5.0 OHMS
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running With the DRB actuate the Generator Field Driver Circuit. Using a 12-volt test light, backprobe the Generator Field Driver Circuit at the back of the Generator. Did the light blink? Yes → Go To 2 No → Go To 4	All
2	Ignition On, Engine Not Running With the DRB actuate the Generator Field Driver Circuit. **Note: Actuator Test should still be running.** Wiggle Wiring Harness from the Generator to PCM. With the DRB, read Codes. Does the Generator Field Driver (-) Circuit code return? Yes → Repair as necessary where wiggling caused problem to appear. Perform the Powertrain Verification Test - Ver 3 No → Go To 3	All
3	Turn ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 3 No → Test Complete.	All

P0622-GENERATOR FIELD NOT SWITCHING PROPERLY — Continued

TEST	ACTION	APPLICABILITY
4	Ignition On, Engine Not Running Record all DTC's and freeze frame data, now erase Codes. Carefully inspect all Connectors for corrosion or spread Terminals before continuing. With the DRB actuate the Generator Field Driver Circuit. Backprobe the ASD Relay Output Circuit at back of Generator. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open ASD Relay Output Circuit. Perform the Powertrain Verification Test - Ver 3	All
5	Turn ignition off. Disconnect the PCM Connectors. Disconnect the Generator Field harness connector. Using an Ohmmeter, measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 3 No → Go To 6	All
6	Turn ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the Generator Field Driver Circuit from PCM to Generator. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open Generator Field Driver Circuit. Perform the Powertrain Verification Test - Ver 3	All
7	Turn ignition off. Disconnect the Generator Field harness connector at back of the Generator. **Note: Check connectors - Clean/repair as necessary.** Use an Ohmmeter in the following steps. Measure resistance across the Generator Field Terminals at the Generator. Is the resistance below 5.0 ohms? Yes → Repair the Generator as necessary. Perform the Powertrain Verification Test - Ver 3 No → Go To 8	All
8	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 3	All

Symptom:

P1478-BATTERY TEMP SENSOR VOLTS OUT OF LIMIT

When Monitored and Set Condition:

P1478-BATTERY TEMP SENSOR VOLTS OUT OF LIMIT

When Monitored: Ignition on.

Set Condition: The Battery Temperature Sensor, internal to the PCM, goes above 4.9 volts or below 0.1 volt for more than 3.2 seconds.

POSSIBLE CAUSES
PCM DEFECTIVE

TEST	ACTION	APPLICABILITY
1	The Powertrain Control Module is reporting an internal trouble code and must be replaced. View repair options. Repair Replace the Powertrain Control Module.	All

Symptom List:

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH
P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH.

When Monitored and Set Condition:

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH

When Monitored: With the ignition key on, the Body Control Module (BCM) transmits temperature data to the PCM via the J1850 bus circuit.

Set Condition: The PCM senses abnormally high or low voltage on its input.

P1493-AMBIENT/BATT TEMP SEN VOLTS TOO LOW

When Monitored: With the ignition key on, the Body Control Module (BCM) transmits temperature data to the PCM via the J1850 bus circuit.

Set Condition: The PCM senses abnormally high or low voltage on its input.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT OPEN
AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
AMBIENT TEMPERATURE SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
SENSOR GROUND CIRCUIT OPEN
SENSOR GROUND CIRCUIT OPEN PARTIALLY SHORTED TO GROUND
AMBIENT TEMPERATURE SENSOR DEFECTIVE
BCM
BCM

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRBIII®, read DTC's. Is the DTC Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 11	All

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
2	Disconnect the Ambient Temperature Sensor. Remove the Ambient Temperature Sensor. Using an ohmmeter, measure the resistance of the Ambient Temperature Sensor across the Sensor. Compare the readings with the Ambient Temp Sensor Specifications on the chart. Do the readings compare with the values listed? Yes → Go To 3 No → Replace the Ambient Temperature Sensor. Perform the Powertrain Verification Test - Ver 5	All
3	Turn the ignition off. Disconnect the Ambient Temperature Sensor connector. Close all doors , insure all lights are off, then wait one minute. Measure the resistance of the sensor ground circuit to ground. Is the resistance below 30 ohms? No → Go To 4 Yes → Go To 6	All
4	Turn ignition off. Disconnect the Ambient Temperature Sensor connector. Disconnect the BCM connector. Measure the resistance of the Sensor Ground circuit between the Ambient Temperature Sensor connector and the BCM. Is the resistance below 5.0 ohms? No → Repair the open Sensor Ground circuit. Perform the Powertrain Verification Test - Ver 5 Yes → Go To 5	All
5	If there are no possible causes remaining, replace the BCM. View repair options. Repair Replace the BCM. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the Ambient Temperature Sensor connectors. Disconnect the BCM connectors. Using an Ohmmeter, measure the resistance of the Ambient Temperature Sensor Signal circuit from the Sensor connector to the BCM connector. Is the resistance below 5.0 ohms? No → Repair the open circuit. Perform the Powertrain Verification Test - Ver 5 Yes → Go To 7	All

P1492-AMBIENT/BATT TEMP SEN VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
7	Turn ignition off. Disconnect the Ambient Temperature Sensor connector. Disconnect the BCM connector. Using an Ohmmeter, measure the resistance between the Sensor Ground circuit and ground at the BCM. Is the resistance below 500K (500,000) ohms? No → Go To 8 Yes → Repair the Sensor Ground circuit for a partial short to ground. Perform the Powertrain Verification Test - Ver 5	All
8	Turn ignition off. Disconnect the Ambient Temperature Sensor connector. Disconnect the BCM connector. Using an Ohmmeter, measure the Ambient Temperature Sensor Signal circuit to ground. Is the resistance below 50K (50,000) ohms? Yes → Repair the Ambient Temperature Sensor signal circuit for a partial short to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 9	All
9	Turn ignition off. Disconnect the Ambient Temperature Sensor connector. Disconnect the BCM connector. Using an Ohmmeter, measure the resistance between the Ambient Temperature Sensor Signal circuit and the Sensor Ground circuit. Is the resistance below 50K (50,000) ohms? Yes → Repair the Ambient Temperature Sensor Signal Circuit for a short to the Sensor Ground Circuit. Perform the Powertrain Verification Test - Ver 5 No → Go To 10	All
10	If there are no possible causes remaining, replace the BCM. View repair options. Repair Replace the BCM. Perform the Powertrain Verification Test - Ver 5	All
11	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored and Set Condition:

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH

When Monitored: With the ignition key on and the engine speed greater than 380 RPM.

Set Condition: When the PCM regulates the generator field and there are no detected field problems, but the voltage output does not decrease.

POSSIBLE CAUSES
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
GENERATOR FIELD SHORTED TO GROUND
PCM (BATTERY TEMPERATURE)
POWERTRAIN CONTROL MODULE (BATTERY VOLTAGE)
POWERTRAIN CONTROL MODULE (GENERATOR RESISTANCE)

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running With DRB, actuate the Generator Field Driver. With a 12-volt test light, backprobe the Generator Field Driver Circuit in back of Generator. Did the light blink? Yes → Go To 2 No → Go To 5	All
2	Ignition On, Engine Not Running With the DRB, actuate the Generator Field Driver. With DRB, stop the Generator Field Driver actuation. With DRB, read the Target Charging voltage. Is the Target Charging voltage above 13 volts? Yes → Go To 3 No → Go To 4	All
3	Start the engine. Manually set the engine speed to 1600 RPM. With DRB, read both the Battery voltage and the Target Charging voltage. Compare the ″Target Voltage″ to the ″Battery Voltage″ reading. Monitor voltage for 5 minutes, if necessary. Look for a 1.0 volt difference or more. Was there more than a 1.0 volt difference? Yes → Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 3 No → Test Complete.	All

P1594-CHARGING SYSTEM VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start engine and allow it to reach operating temperature. With the DRB, read the BTS temperature. Using a Thermometer, measure under hood temperature. Is the temperature within 10 F degrees of Battery temperature? Yes → Test Complete. No → Replace Powertrain Control Module. Perform the Powertrain Verification Test - Ver 3	All
5	Turn ignition off. Disconnect the PCM Connectors. Disconnect the Generator Field harness connector. Using an Ohmmeter, measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 3 No → Go To 6	All
6	Turn ignition off. Disconnect the Field Harness Connector at back of the Generator. **Note: Check connectors - Clean/repair as necessary.** Measure resistance of the Generator Field Driver Circuit at the Generator to Ground. Is the resistance below 5.0 ohms? Yes → Repair or replace the shorted Generator as necessary. Perform the Powertrain Verification Test - Ver 3 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 3	All

Symptom:

P1682-CHARGING SYSTEM VOLTAGE TOO LOW

When Monitored and Set Condition:

P1682-CHARGING SYSTEM VOLTAGE TOO LOW

When Monitored: With the ignition key on and the engine running over 1152 RPM. With no other charging system codes set.

Set Condition: The battery sensed voltage is 1 volt below the charging goal for 25 seconds. The PCM senses the battery Voltage turns off the field driver and senses the battery voltage again. If the voltages are the same, the code is set.

POSSIBLE CAUSES
B (+) CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
ASD RELAY OUTPUT CIRCUIT OPEN
ASD RELAY OUTPUT CIRCUIT SHORTED TO GROUND
GENERATOR FIELD DRIVER CIRCUIT OPEN
GENERATOR FIELD DRIVER CIRCUIT SHORTED TO GROUND
PCM
PCM DEF (CHARGING SYSTEM VOLTAGE LOW)

TEST	ACTION	APPLICABILITY
1	Turn Ignition Off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start Engine. With the DRB, read the target charging voltage. Is the target charging voltage above 15.1 volts? Yes → Go To 2 No → Go To 3	All
2	Turn ignition off. **Note: Battery must be fully charged.** **Note: Generator Belt tension and condition must be checked before continuing.** Start engine and allow it to reach operating temperature. With the DRB, read the BTS temperature. Using a Thermometer, measure under hood temperature. Is the temperature within 10 F degrees of Battery temperature? Yes → Go To 3 No → Replace the PCM. Perform the Powertrain Verification Test - Ver 3	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition on, engine not running. Using a Voltmeter, measure voltage between the Generator B(+) Terminal and the Battery (+) Post. **Caution: Ensure all wires are clear of the engine's moving parts.** Start engine. Is the voltage above 0.4 volt? Yes → Repair the B(+) Circuit for high resistance between the Generator and Battery. Perform the Powertrain Verification Test - Ver 3 No → Go To 4	All
4	Start engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Using a Voltmeter, measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform the Powertrain Verification Test - Ver 3 No → Go To 5	All
5	Start engine. Turn on all accessories, manually set engine speed to 1600 RPM. With DRB, read Target Charging and Charging voltage. Compare the two readings. Is there more than a 1.0 volt difference? Yes → Go To 6 No → Test Complete.	All
6	Ignition On, Engine Not Running With the DRB, actuate the Generator Field. Using a Voltmeter, measure the voltage at both Generator Field Terminals. Is the voltage below 3.0 volts at either Terminal? Yes → Go To 7 No → Test Complete.	All
7	Ignition On, Engine Not Running Record all DTC's and freeze frame data, now erase Codes. Carefully inspect all Connectors for corrosion or spread Terminals before continuing. With the DRB actuate the Generator Field Driver Circuit. Backprobe the ASD Relay Output Circuit at back of Generator. Is the voltage above 10.0 volts? Yes → Go To 8 No → Repair the open ASD Relay Output Circuit. Perform the Powertrain Verification Test - Ver 3	All

P1682-CHARGING SYSTEM VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Disconnect the PCM Connectors. Disconnect the Generator Field harness connector. Using an Ohmmeter, measure the Generator Field Driver Circuit from PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Generator Field Driver Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 3 No → Go To 9	All
9	Turn ignition off. Disconnect ASD Relay Connector. **Note: Check connectors - Clean/repair as necessary.** Disconnect the generator field connector. **Note: Check Connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the ASD Relay Output Circuit from ASD Relay Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the ASD Relay Output Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 3 No → Go To 10	All
10	Turn ignition off. Disconnect the PCM harness connectors. Disconnect the Generator Field harness connector. **Note: Check Connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the Generator Field Driver Circuit from PCM to Generator. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the open Generator Field Driver Circuit. Perform the Powertrain Verification Test - Ver 3	All
11	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 3	All

Symptom:

***CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT**

POSSIBLE CAUSES
B (+) CIRCUIT HIGH RESISTANCE
GENERATOR GROUND HIGH RESISTANCE
B(+) CIRCUIT HIGH RESISTANCE (1.0 VOLT)
GENERATOR BELT OBSERVABLE PROBLEM
GENERATOR FIELD TERMINAL INTERMITTENT PROBLEM
TROUBLE CODES PRESENT
TROUBLE CODES PRESENT 2000 RPM
PCM (CHARGING SYSTEM NO CODE)

TEST	ACTION	APPLICABILITY
1	Turn ignition off. **Note: Battery condition must be verified prior to this test.** Inspect the Generator Belt tension and condition. Is the Generator Belt OK? Yes → Go To 2 No → Repair as necessary. Perform the Powertrain Verification Test - Ver 3	All
2	Start the Engine. Turn on all accessories. Raise engine speed to 2000 RPM for 30 seconds then return to idle. With the DRB III read DTC's. Are there any ″Charging System″ Trouble Codes? Yes → Refer to Symptom list for problems related to Charging. Perform the Powertrain Verification Test - Ver 3 No → Go To 3	All
3	Ignition On, Engine Not Running With the DRB, actuate the Generator Field. Using a 12-volt test light, backprobe the Generator Field Driver Terminal at the back of the Generator. **Note: The test light should blink On and Off every 1.4 seconds.** While monitoring the 12-volt test light, wiggle the Field Terminals back to the PCM and ASD Relay. Was there any interruption in the normal cycle of the test light? Yes → Repair the wire where wiggling interrupted the voltage cycle. Perform the Powertrain Verification Test - Ver 3 No → Go To 4	All

*CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
4	Ignition On, Engine Not Running With the DRB, read trouble codes. Are there any ″Charging System″ trouble codes? Yes → Refer to Symptom list for problems related to Charging. Perform the Powertrain Verification Test - Ver 3 No → Go To 5	All
5	Turn ignition on, engine not running. Using a Voltmeter, measure voltage between the Generator B(+) Terminal and the Battery (+) Post. **Caution: Ensure all wires are clear of the engine's moving parts.** Start engine. Is the voltage above 0.4 volt? Yes → Repair the B(+) Circuit for high resistance between the Generator and Battery. Perform the Powertrain Verification Test - Ver 3 No → Go To 6	All
6	Start engine. Warm the engine to operating temperature. **Caution: Ensure all wires are clear of the engine's moving parts.** Using a Voltmeter, measure voltage between the Generator case and Battery (-) Post. Is the voltage above 0.1 volt? Yes → Repair Generator Ground for high resistance, Generator Case to Battery (-) side. Perform the Powertrain Verification Test - Ver 3 No → Go To 7	All
7	Ignition On, Engine Not Running. With the DRB, read the Battery voltage and record the results. Using a Voltmeter, measure Battery voltage B(+) to B(-) Terminal and record the results. Compare the two voltage readings. Is the voltage difference less than one volt? Yes → Test Complete. No → Go To 8	All
8	Ignition On, Engine Not Running With the DRB, read the Battery voltage and record the results. Turn Ignition off. Disconnect the PCM. **Note: Check connectors - Clean/repair as necessary.** Turn Ignition on, with the engine off. Using a Voltmeter, measure the Fused B(+) at PCM Connector. Is the voltage within one volt of the DRB recorded reading? Yes → Go To 9 No → Repair the B(+) Circuit for high resistance between the PCM and the Battery. Perform the Powertrain Verification Test - Ver 3	All

*CHECKING CHARGING SYSTEM OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
9	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 3	All

Symptom:

*CHECKING THE AMBIENT/BATTERY TEMPERATURE SENSOR

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
BTS DEFECTIVE (OUT OF CALIBRATION)

TEST	ACTION	APPLICABILITY
1	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 2	All
2	Turn ignition on. With the DRB in sensors, read the ″Ambient/Bat Tmp Deg″ value and record the reading. Using a temp probe, measure the air temperature near the BTS. Is the recorded BTS temperature value within 10° of the temperature probe reading? Yes → Test Complete. No → Replace the BTS. Perform the Powertrain Verification Test - Ver 5	All

Symptom List:

P0600-PCM FAILURE SPI COMMUNICATIONS
P0601-PCM INTERNAL CONTROLLER FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0600-PCM FAILURE SPI COMMUNICATIONS.

When Monitored and Set Condition:

P0600-PCM FAILURE SPI COMMUNICATIONS

When Monitored: Ignition key on.

Set Condition: Internal Bus communication failure between processors.

P0601-PCM INTERNAL CONTROLLER FAILURE

When Monitored: Ignition key on.

Set Condition: Internal checksum for software failed, does not match calculated value.

POSSIBLE CAUSES
PCM (INTERNAL OR SPI)

TEST	ACTION	APPLICABILITY
1	The Powertrain Control Module is reporting internal errors and must be replaced. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A.	All

Symptom:
P1685-INVALID SKIM KEY

When Monitored and Set Condition:

P1685-INVALID SKIM KEY

When Monitored: At ignition key on.

Set Condition: This condition exists when the transponder ID (KEY) read by the SKIM does not match any of the transponder ID's stored in the SKIM's memory. The following could be new or does not match, PCM, SKIM, or KEY.

POSSIBLE CAUSES
INCORRECT VIN IN PCM
INVALID SKIM KEY NOT PRESENT
NO VIN PROGRAMMED IN THE PCM
PCM DEFECTIVE
SKIM TROUBLE CODES SET

TEST	ACTION	APPLICABILITY
1	With the DRB read trouble codes. LOOK FOR P1685 Is the starts since set counter Zero, on the DRB DTC screen for code P1685? Yes → Go To 2 No → Go To 7	All
2	Using the DRB, attempt to communicate with SKIM. Can you communicate with the SKIM? Yes → Go To 3 No → Refer to symptom *BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category.	All
3	Using the DRB, check for trouble codes set in SKIM. Are there any trouble codes set in the SKIM? Yes → Repair all trouble codes set in SKIM first. Perform Powertrain Verification Test VER-1A. No → Go To 4	All
4	**Note: If a VIN is not been programmed into the PCM, program VIN into PCM and retest.** With the DRB, display the VIN that is programmed in the PCM. Is the a VIN programmed in the PCM? Yes → Go To 5 No → Program the correct VIN into the PCM and retest. Perform Powertrain Verification Test VER-1A.	All

P1685-INVALID SKIM KEY — Continued

TEST	ACTION	APPLICABILITY
5	With the DRB, display the VIN that is programmed in the PCM. Is the correct VIN programmed in the PCM? Yes → Go To 6 No → Replace the Powertrain Control Module (PCM) and program correct VIN in the PCM and retest. Perform Powertrain Verification Test VER-1A.	All
6	Turn ignition off. Replace the SKIM. With the DRB, erase all DTC's. Attempt to start and idle the engine. Using the DRB, read the PCM trouble codes. Does the DRB display this code? Yes → Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A. No → Test Complete.	All
7	**Note: This DTC could have been set if the SKIM module was disconnected, or replaced recently.** **Note: All keys that the customer uses for this vehicle must be tested to verify they are good.** First verify the correct VIN is in both the PCM and SKIM modules. Turn the Ignition key off. With the next customer key turn the ignition key on and crank the engine to start. If the engine starts that is usually a good key. With the DRB read trouble codes. LOOK FOR P1685 Is the starts since set counter Zero, on the DRB DTC screen for code P1685? Yes → Replace the Ignition Key. Perform Powertrain Verification Test VER-1A. No → Test Complete. **Note: If this DTC can not be reset, it could have been an actual theft attempt.**	All

Symptom:

P1686-NO SKIM BUS MESSAGE RECEIVED

When Monitored and Set Condition:

P1686-NO SKIM BUS MESSAGE RECEIVED

When Monitored: At ignition key on and continuously during engine operation.

Set Condition: This condition exists when a SKIM status bus message was not received from the SKIM module within the last 20 seconds.

POSSIBLE CAUSES
PCM DEFECTIVE
WIRING HARNESS INTERMITTENT DEFECT
PCI BUS CIRCUIT OPEN FROM PCM TO SKIM

TEST	ACTION	APPLICABILITY
1	Turn ignition on, Engine not running. With the DRB read PCM trouble codes. LOOK for P1686. Is the starts since set counter on the DTC screen for P1686 equal to Zero? Yes → Go To 2 No → Go To 4	All
2	Turn ignition on, Engine not running. Connect the DRBIII and try to access the SKIM module. With the DRB, select vehicle Theft Alarm and read SKIM Trouble Codes. **Note: This test will indicate if the Bus is operational from DLC to SKIM..** Were you able to establish communication to the SKIM? Yes → Go To 3 No → Refer to symptom *BUS +/- SIGNAL OPEN FROM SKIM in the COMMUNICATION category.	All
3	Turn ignition off. Disconnect the PCM. Disconnect the SKIM. Using an ohmmeter, measure the PCI Bus Circuit between the PCM and SKIM. Is the resistance below 5.0 ohms? Yes → Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A. No → Repair the open PCI Bus Circuit. Perform Powertrain Verification Test VER-1A.	All

P1686-NO SKIM BUS MESSAGE RECEIVED — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-1A. No → Test Complete.	All

Symptom:

P1687-NO CLUSTER BUS MESSAGE

When Monitored and Set Condition:

P1687-NO CLUSTER BUS MESSAGE

When Monitored: Ignition key on.

Set Condition: No messages received from the MIC (Instrument Cluster) for 20 seconds.

POSSIBLE CAUSES
INSTRUMENT CLUSTER DEFECTIVE
WIRING HARNESS INTERMITTENT DEFECT
PCI BUS CIRCUIT OPEN FROM PCM TO MIC

TEST	ACTION	APPLICABILITY
1	Turn ignition on, Engine not running. Using the DRB, erase codes. Cycle the ignition key on and off several times. With the DRB read PCM trouble codes. LOOK for P1687. Did the ″No PCI Bus Message from MIC″ trouble code return? Yes → Go To 3 No → Go To 2	All
2	Turn the ignition key on, Engine not running. Does the Odometer in the Instrument Cluster display ″No Bus″? Yes → Go To 3 No → Go To 4	All
3	Turn ignition off. Disconnect the PCM. Disconnect the Instrument Cluster Connector. Using an ohmmeter, measure the PCI Bus Circuit between the PCM and the Instrument Cluster Connector. Is the resistance below 5.0 ohms? Yes → Replace the Instrument Cluster. Perform Powertrain Verification Test VER-1A. No → Repair the open PCI Bus Circuit. Perform Powertrain Verification Test VER-1A.	All

P1687-NO CLUSTER BUS MESSAGE — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-1A. No → Test Complete.	All

Symptom:
P1695-NO CCD/J1850 MESSAGE FROM BODY CONTROL MODULE

When Monitored and Set Condition:

P1695-NO CCD/J1850 MESSAGE FROM BODY CONTROL MODULE

When Monitored: With the ignition on, engine running, auto transmission must be in drive, and battery voltage greater than 10.0 volts.

Set Condition: No messages recieved from the BCM for 20 seconds.

POSSIBLE CAUSES
BCM DEFECTIVE
FUSED B(+) CIRCUIT LESS THAN 10.0 VOLTS
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
PCM GROUND CIRCUIT(S) OPEN
WIRING HARNESS INTERMITTENT DEFECT
PCI BUS CKT OPEN
PCM DEFECTIVE

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the ″Starts Since Set″ counter displayed and equal to one or below. Yes → Go To 2 No → Go To 8	All
2	**Note: If the BUS is not operational, it will display on the odometer.** Does the odometer display ″No Bus″? Yes → Refer to symptom *PCI BUS COMMUNICATION FAILURE in the COMMUNICATION category. No → Go To 3	All
3	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition key on. Use a 12 volt test light in the following step. With the 12V test light connected to ground, probe the Fused Ignition in the PCM Connector. Is the test light illuminated and bright? Yes → Go To 4 No → Repair the open or high resistance Fused Ignition Switch Output Circuit between PCM & Ignition Switch. Perform the Powertrain Verification Test - Ver 1.	All

P1695-NO CCD/J1850 MESSAGE FROM BODY CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the Ignition Off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect the test light to Ground. Probe the B(+) Circuit in the PCM Connector. Is the test light illuminated and bright? No → Repair the fused B+ circuit for High resistance. If open circuit PCM will show ″NO RESPONSE″ Perform Powertrain Verification Test VER-1A. Yes → Go To 5	All
5	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect 12V test light to B(+). Probe the Ground Circuits, one at a time, in the PCM Connector. Was the light illuminated and bright in each circuit? Yes → Go To 6 No → Repair the ground(s) for an open or high resistance at the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 1.	All
6	With the DRB, read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational. **Note: If the DRB will not read PCM DTC's, follow the ″NO RESPONSE TO PCM (SCI only)″ symptom path, if vehicle will start. For NO START Conditions follow symptom ″NO RESPONSE″ in Starting catagory .** Turn the ignition off. Disconnect the PCM harness connector. Connect the DRB to the Data Link connector Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. Select DRB Standalone. Select lab scope. Select Live. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the PCM ground. Connect the Red lead to the PCM PCI Bus circuit Turn the ignition on. Observe the the voltage displayed on the DRB Lab Scope. What is the voltage displayed on the scope? Pulse from 0 to approximately 7.5 volts Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A. Steady 0 volts Go To 7	All

P1695-NO CCD/J1850 MESSAGE FROM BODY CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the BCM harness connector. Measure the resistance of the PCI Bus circuit from the PCM to the BCM. Is the resistance below 5.0 ohms? Yes → Replace the BCM. Perform Powertrain Verification Test VER-1A. No → Repair the open PCI Bus circuit. Perform Powertrain Verification Test VER-1A.	All
8	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-1A. No → Test Complete.	All

Symptom:
P1696-PCM FAILURE EEPROM WRITE DENIED

When Monitored and Set Condition:

P1696-PCM FAILURE EEPROM WRITE DENIED

When Monitored: Ignition key on, Continuous.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at powerdown.

POSSIBLE CAUSES
COMPARE SRI MILEAGE WITH ODOMETER
DRB DISPLAYS ″SRI MILEAGE INVALID″
DRB DISPLAYS WRITE REFUSED 2ND TIME

TEST	ACTION	APPLICABILITY
1	With the DRB, perform the SRI Memory Test. Does the DRB display ″Write Refused″? Yes → Go To 2 No → Go To 3	All
2	With the DRB, perform the SRI Memory Test a second time. **Note: Retest the SRI Memory two more times.** Does the DRB display ″Write Refused″ again? Yes → Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A. No → Test Complete.	All
3	With the DRB, perform the SRI Memory Test. Does the DRB display ″SRI Mileage Invalid″? Yes → Update the mileage and retest the SRI Memory. Perform Powertrain Verification Test VER-1A. No → Go To 4	All
4	Compare the SRI Mileage stored with the Instrument Panel Odometer. Is the mileage within the specified range displayed on the DRB? Yes → Test Complete. No → Update the mileage and retest the SRI Memory. Perform Powertrain Verification Test VER-1A.	All

Symptom:
P1697-PCM FAILURE SRI MILE NOT STORED

When Monitored and Set Condition:

P1697-PCM FAILURE SRI MILE NOT STORED

When Monitored: Ignition key on, Continuous.

Set Condition: An attempt to program/write to the internal EEPROM failed, Also checks at powerdown.

POSSIBLE CAUSES
DRB DISPLAYS ″WRITE FAILURE″
COMPARE SRI MILEAGE WITH ODOMETER
DRB DISPLAYS ″SRI MILEAGE INVALID″
DRB DISPLAYS WRITE REFUSED 2ND TIME

TEST	ACTION	APPLICABILITY
1	With the DRB, perform the SRI Memory Test. Does the DRB display ″Write Failure″? Yes → Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A. No → Go To 2	All
2	With the DRB, perform the SRI Memory Test. Does the DRB display ″Write Refused″? Yes → Go To 3 No → Go To 4	All
3	With the DRB, perform the SRI Memory Test a second time. **Note: Retest the SRI Memory two more times.** Does the DRB display ″Write Refused″ again? Yes → Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A. No → Test Complete.	All
4	With the DRB, perform the SRI Memory Test. Does the DRB display ″SRI Mileage Invalid″? Yes → Update the mileage and retest the SRI Memory. Perform Powertrain Verification Test VER-1A. No → Go To 5	All

P1697-PCM FAILURE SRI MILE NOT STORED — Continued

TEST	ACTION	APPLICABILITY
5	Compare the SRI Mileage stored with the Instrument Panel Odometer. Is the mileage within the specified range displayed on the DRB? Yes → Test Complete. No → Update the mileage and retest the SRI Memory. Perform Powertrain Verification Test VER-1A.	All

Symptom:
P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE

When Monitored and Set Condition:

P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE

When Monitored: Equipped with automatic transmission, the ignition key on, engine running, transmission in drive, vehicle road speed and battery voltage greater than 10 volts.

Set Condition: No bus messages from the TCM for 10 seconds, two trips required.

POSSIBLE CAUSES
FUSED B(+) CIRCUIT LESS THAN 10.0 VOLTS
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
PCM GROUND CIRCUIT(S) OPEN
PCM INTERNAL PCI BUS OPEN
PCM PCI BUS CIRCUIT OPEN
WIRING HARNESS INTERMITTENT DEFECT

TEST	ACTION	APPLICABILITY
1	Turn ignition on, Engine not running. With the DRB read PCM trouble codes. LOOK for P1698. Is the Starts since Set counter on the screen for DTC P1698 equal to Zero? Yes → Go To 2 No → Go To 9 **Note: This DTC could have been set when the TCM is disconnected for transmission Diagnostics.**	All
2	Turn ignition on, Engine not running. Connect the DRBIII and access Powertrain Control Module. **Note: This test checks for other PCI BUS codes. That indicates diferent circuits in the BUS.** With the DRB read PCM trouble codes. Is a DTC also set for NO SKIM BUS MESSAGE and/or No MIC BUS MESSAGE? Yes → Go To 3 No → Refer to symptom *NO RESPONSE FROM TCM in the COMMUNICATION category.	All

P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
3	Turn Ignition On. **Note: As soon as one or more module communicates with the DRBIII, answer the question.** With the DRBIII, Select THEFT ALARM, then select SKIM. With the DRBIII, Select THEFT ALARM, Then select VTSS. With the DRBIII, Select ANTI-LOCK BRAKES. With the DRBIII, Select BODY, Then Select ELECTRO-MECHANICAL CLUSTER (MIC). With the DRBIII, Select PASSIVE RESTRAINTS, Then select AIRBAG. Were you able to establish communication with any of the modules? Yes → Go To 4 No → Refer to symptom *PCI BUS COMMUNICATION FAILURE in the COMMUNICATION category.	All
4	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition key on. Use a 12 volt test light in the following step. With the 12V test light connected to ground, probe the Fused Ignition in the PCM Connector. Is the test light illuminated and bright? Yes → Go To 5 No → Repair the open or high resistance Fused Ignition Switch Output Circuit between PCM & Ignition Switch. Perform the Powertrain Verification Test - Ver 1.	All
5	Turn the Ignition Off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect the test light to Ground. Probe the B(+) Circuit in the PCM Connector. Is the test light illuminated and bright? No → Repair the fused B+ circuit for High resistance. If open circuit PCM will show ″NO RESPONSE″ Perform Powertrain Verification Test VER-1A. Yes → Go To 6	All
6	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect 12V test light to B(+). Probe the Ground Circuits, one at a time, in the PCM Connector. Was the light illuminated and bright in each circuit? Yes → Go To 7 No → Repair the ground(s) for an open or high resistance at the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 1.	All

P1698-NO BUS MESSAGE FROM TRANS CONTROL MODULE — Continued

TEST	ACTION	APPLICABILITY
7	With the DRB read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational. **Note: If the DRB will not read PCM DTC's, follow the ″NO RESPONSE TO PCM (SCI only)″ symptom path, if vehicle will start. For NO START Conditions follow symptom ″NO RESPONSE″ in Starting catagory .** Turn ignition off. Disconnect the Powertrain Control Module. Connect the DRBIII to the Data Link connector Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. Select DRB Standalone. Select lab scope. Select Live. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the PCM ground. Connect the Red lead to the PCM PCI Bus circuit Turn the ignition on. Observe the the voltage displayed on the DRB Lab Scope. What is the voltage displayed on the scope? Pulse from 0 to approximately 7.5 volts Go To 8 Steady 0 volts Repair the open PCI Bus circuit to PCM. Perform Powertrain Verification Test VER-1A.	All
8	The Powertrain Control Module has an internal open PCI Bus and must be replaced. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A.	All
9	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-1A. No → Test Complete.	All

Symptom:

***BUS +/- SIGNAL OPEN FROM SKIM**

POSSIBLE CAUSES
SKIM RESPONSE FAILURE
PCI BUS OPEN CIRCUIT TO SKIM
SKIM FUSED B(+) OPEN
SKIM FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
SKIM GROUND CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn ignition on. Using the DRB, attempt to communicate with SKIM. Did you communicate with the SKIM? No → Go To 2 Yes → Test Complete.	All
2	Disconnect the SKIM connector. Using a voltmeter, measure the Fused B(+) voltage at the SKIM connector. Is the Fused B(+) above 10.0 volts? Yes → Go To 3 No → Repair the open Fused B+ circuit to the SKIM. Perform the SKIS Verification Test.	All
3	Disconnect the SKIM connector. Turn Ignition on. Using a voltmeter, measure the Fused Ignition Switch output voltage at the SKIM connector. Is the Fused Ignition Switch voltage above 10.0 volts? Yes → Go To 4 No → Repair the open Fused Ignition Switch Output circuit. Perform the SKIS Verification Test.	All
4	Disconnect the SKIM connector. Using an ohmmmeter, measure the resistance between the SKIM ground circuit at the SKIM connector and ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open Sentry Key Immobilizer Module ground circuit. Perform the SKIS Verification Test.	All

*BUS +/- SIGNAL OPEN FROM SKIM — Continued

TEST	ACTION	APPLICABILITY
5	Disconnect the Sentry Key Immobilizer Module. Connect the DRB III to the Data Link connector. Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB III. Attach the red and black leads and the cable to probe adapter to the scope input cable. Select DRB Standalone. Select lab scope. Select Live. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the SKIM ground. Connect the Red lead to the SKIM PCI Bus circuit Turn the ignition on. Observe the voltage displayed on the DRB III Lab Scope. What is the voltage displayed on the scope? Pulse from 0 to approximately 7.5 volts Replace the Sentry Key Immobilizer Module. Perform the SKIS Verification Test. Steady 0.0 volt Repair the Open PCI BUS circuit to the SKIM. Perform the SKIS Verification Test.	All

Symptom:
*NO RESPONSE FROM PCM (PCI BUS)

POSSIBLE CAUSES
FUSED B(+) CIRCUIT LESS THAN 10.0 VOLTS
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
PCM GROUND CIRCUIT(S) OPEN
PCM INTERNAL PCI BUS OPEN
PCM PCI BUS CIRCUIT OPEN

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. **Note: As soon as one or more module communicates with the DRBIII, answer the question.** With the DRBIII, Select THEFT ALARM, then select SKIM. With the DRBIII, Select THEFT ALARM, Then select VTSS. With the DRBIII, Select ANTI-LOCK BRAKES. With the DRBIII, Select BODY, Then Select ELECTRO-MECHANICAL CLUSTER (MIC). With the DRBIII, Select PASSIVE RESTRAINTS, Then select AIRBAG. Were you able to establish communication with any of the modules? Yes → Go To 2 No → Refer to symptom *PCI BUS COMMUNICATION FAILURE in the COMMUNICATION category.	All
2	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition key on. Use a 12 volt test light in the following step. With the 12V test light connected to ground, probe the Fused Ignition in the PCM Connector. Is the test light illuminated and bright? Yes → Go To 3 No → Repair the open or high resistance Fused Ignition Switch Output Circuit between PCM & Ignition Switch. Perform the Powertrain Verification Test - Ver 1.	All
3	Turn the Ignition Off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect the test light to Ground. Probe the B(+) Circuit in the PCM Connector. Is the test light illuminated and bright? No → Repair the fused B+ circuit for High resistance. If open circuit PCM will show ″NO RESPONSE″ Perform Powertrain Verification Test VER-1A. Yes → Go To 4	All

*NO RESPONSE FROM PCM (PCI BUS) — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect 12V test light to B(+). Probe the Ground Circuits, one at a time, in the PCM Connector. Was the light illuminated and bright in each circuit? Yes → Go To 5 No → Repair the ground(s) for an open or high resistance at the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 1.	All
5	With the DRB read PCM Diagnostic Trouble Codes. This is to ensure power and grounds to the PCM are operational. **Note: If the DRB will not read PCM DTC's, follow the ″NO RESPONSE TO PCM (SCI only)″ symptom path, if vehicle will start. For NO START Conditions follow symptom ″NO RESPONSE″ in Starting catagory .** Turn ignition off. Disconnect the Powertrain Control Module. Connect the DRBIII to the Data Link connector Use Scope input cable CH7058, Cable to Probe adapter CH7062, and the red and black test probes. Connect the scope input cable to the channel one connector on the DRB. Attach the red and black leads and the cable to probe adapter to the scope input cable. Select DRB Standalone. Select lab scope. Select Live. Select 12 volt square wave. Press F2 for Scope. Press F2 and use the down arrow to set voltage range to 20 volts. Press F2 again when complete. Connect the Black lead to the PCM ground. Connect the Red lead to the PCM PCI Bus circuit Turn the ignition on. Observe the the voltage displayed on the DRB Lab Scope. What is the voltage displayed on the scope? Pulse from 0 to approximately 7.5 volts Go To 6 Steady 0 volts Repair the open PCI Bus circuit to PCM. Perform Powertrain Verification Test VER-1A.	All
6	The Powertrain Control Module has an internal open PCI Bus and must be replaced. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-1A.	All

Symptom:

***NO RESPONSE FROM PCM (SCI ONLY)**

POSSIBLE CAUSES
GROUND CIRCUIT(S) OPEN TO DATA LINK CONNECTOR
″NO RESPONSE″ DISPLAYED FROM DRB (SCI ONLY)
DRB
DRB ADAPTER CABLE
SCI RECEIVE CIRCUIT OPEN
SCI RECEIVE CIRCUIT SHORTED TO GROUND
SCI TRANSMIT CIRCUIT OPEN
SCI TRANSMIT CIRCUIT SHORTED TO GROUND
PCM (NO RESPONSE-START)

TEST	ACTION	APPLICABILITY
1	Turn ignition off. Disconnect the DRB from the Data Link Connector. Measure the resistance of each of the ground circuits between the data link connector and a good ground. Is the resistance below 5.0 ohms for both circuits? Yes → Go To 2 No → Repair the open ground circuit(s). Perform Powertrain Verification Test VER-1A.	All
2	With the DRB, attempt to read trouble codes. Was the ignition on when the ″NO RESPONSE″ message was displayed? Yes → Go To 3 No → Turn ignition on to get a response. Perform Powertrain Verification Test VER-1A.	All
3	Substitute another DRB adapter cable. With the DRB, attempt to read trouble codes. Did the DRB display ″No Response″? Yes → Go To 4 No → Replace the DRB Adapter Cable. Perform Powertrain Verification Test VER-1A.	All
4	Turn ignition off. Disconnect the Powertrain Control Module. Disconnect DRB from the Data Link Connector (DLC). Using an Ohmmeter, measure the resistance of the SCI Receive Circuit from the PCM to the DLC. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open SCI Receive Circuit. Perform the Powertrain Verification Test - Ver 1.	All

*NO RESPONSE FROM PCM (SCI ONLY) — Continued

TEST	ACTION	APPLICABILITY
5	Turn ignition off. Disconnect the Powertrain Control Module. Disconnect DRB from the Data Link Connector (DLC). Using an Ohmmeter, measure the resistance between the SCI Receive Circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the SCI Receive Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 1. No → Go To 6	All
6	Turn ignition off. Disconnect the Powertrain Control Module. Disconnect DRB from the Data Link Connector (DLC). Using an Ohmmeter, measure the resistance of the SCI Transmit Circuit from the PCM to the DLC. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open SCI Transmit Circuit. Perform the Powertrain Verification Test - Ver 1.	All
7	Turn ignition off. Disconnect the Powertrain Control Module. Disconnect DRB from the Data Link Connector (DLC). Using an Ohmmeter, measure the resistance between the SCI Transmit Circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the SCI Transmit Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 1. No → Go To 8	All
8	Connect the DRB to a functional Data Link on another vehicle. Turn ignition on. With the DRB, attempt to read trouble codes. Did the DRB display ″No Response″? Yes → Go To 9 No → Replace the initial vehicle's Powertrain Control Module. Perform Powertrain Verification Test VER-1A.	All
9	If there are no potential causes remaining, repair or replace the DRB. View repair options. Repair Have the DRB repaired or replaced. Perform Powertrain Verification Test VER-1A.	All

Symptom:
*NO RESPONSE FROM TCM

POSSIBLE CAUSES
FUSED IGNITION SWITCH OUTPUT (RUN/ST) CIRCUIT OPEN
FUSED IGNITION SWITCH OUTPUT (START) CIRCUIT OPEN
GROUND CIRCUIT OPEN
FUSED B(+) CIRCUIT TO TCM OPEN
OTHER BUS PROBLEMS PRESENT
PCI BUS CIRCUIT OPEN
TCM (PCI BUS CIRCUIT)

TEST	ACTION	APPLICABILITY
1	With the DRBIII®, attempt to read Transmission DTC's. Does the DRB show ″NO RESPONSE to TCM″? Yes → Go To 2 No → Test Complete.	All
2	With the DRBIII, check all of the other modules on the vehicle for evidence of a vehicle bus problem. Bus related DTC's in other modules point to an overall vehicle bus problem. Other symptoms such as a customer complaint of intermittent operation of bus controlled features also indicate a bus problem. Does the PRNDL display indicate ″No Bus″ or is there any evidence of an overall vehicle bus problem? Yes → Diagnose and repair other bus problems as necessary. Perform the 42LE Transmission Verification Test - Ver 1. No → Go To 3	All
3	Turn ignition off to the lock position. Disconnect the Transmission Control Module (TCM). **Note: Check connectors - Clean/repair as necessary.** Connect the ground lead of a test light to a known good ground. Turn the ignition on. Using a 12-volt Test Light connected to ground, check the Fused Ignition Switch Output (Run/St) circuit in the TCM connector. **Note: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery positive post.** Does the test light illuminate brightly. Yes → Go To 4 No → Repair cause of not lit or dim test light in Fused Ignition Switch Output (Run/St) circuit. Perform the 42LE Transmission Verification Test - Ver 1.	All

*NO RESPONSE FROM TCM — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off to the lock position. Disconnect the TCM connector. Remove the starter relay from the PDC. Connect the ground lead of a test light to a known good ground. Using a 12-volt Test Light connected to ground, check the Fused Ignition Switch Output (Start) circuit in the TCM connector. Turn the ignition switch to the start position. **Note: The light must illuminate brightly, if it does not light, or lights dimly, the circuit must be repaired. If there is any doubt, compare the brightness when testing the circuit, to the brightness when connected directly to the battery positive post.** Does the test light illuminate brightly. Yes → Go To 5 No → Repair cause of unlit or dim test light in Fused Ignition Switch Output (Start) circuit. Perform the 42LE Transmission Verification Test - Ver 1. **Note: Reinstall the Starter Relay.**	All
5	Turn ignition off to the lock position. Disconnect the Transmission Control Module (TCM) harness connector. **Note: Check connectors - Clean/repair as necessary.** Connect the ground clip of a test light to a known good 12 volt source on the vehicle such as the positive battery post. Probe all ground circuit(s) in the TCM connector with the test light.. Does the light illuminate brightly at all ground circuits? Yes → Go To 6 No → Repair the Ground circuit(s) as necessary. Perform the 42LE Transmission Verification Test - Ver 1.	All
6	Turn ignition off to the lock position. Disconnect the Transmission Control Module (TCM) harness connector. Connect the ground clip of a test light to a known good ground. Connect the other end to the Fused B(+) circuit in the TCM connector. Does the test light illuminate brightly? Yes → Go To 7 No → Repair Fused B(+) Circuit wiring and / or connectors. Perform the 42LE Transmission Verification Test - Ver 1.	All
7	Turn ignition off to the lock position. Disconnect the Transmission Control Module (TCM) harness connector. Disconnect the Body Control Module (BCM) harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the PCI Bus circuit from the TCM connector to the BCM connector. Is the resistance above 5.0 ohms? Yes → Repair the open PCI Bus circuit between the TCM and the BCM. Perform the 42LE Transmission Verification Test - Ver 1. No → Go To 8	All

*NO RESPONSE FROM TCM — Continued

TEST	ACTION	APPLICABILITY
8	TheTransmission Control Module has a bus problem and must be replaced. View repair options. Repair Replace the Transmission Control Module. Perform the 42LE Transmission Verification Test - Ver 1.	All

Symptom:
*PCI BUS COMMUNICATION FAILURE

POSSIBLE CAUSES
PCI BUS CIRCUIT SHORTED TO GROUND
PCI BUS CIRCUIT SHORTED TO VOLTAGE
HIGH VOLTAGE ON THE PCI BUS CIRCUITS AT THE BCM CONNECTORS
LOW RESISTANCE TO GROUND ON THE PCI BUS CIRCUITS AT THE BCM CONNECTORS
MODULE (PCI BUS SHORT TO GROUND)
MODULE (PCI BUS SHORT TO VOLTAGE)
BODY CONTROL MODULE
OPEN PCI BUS CIRCUIT BETWEEN THE DLC AND THE BCM
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	**Note: When attempting to communicate with any of the modules on this vehicle, the DRB will display 1 of 2 different communication errors: A "no response" message or a "BUS +/- Signal Open" message.** Turn the ignition on. With the DRB, attempt to communicate with the following modules: Body Control Module (BCM), Instrument Cluster (MIC), Controller Anti-lock Brake (CAB), and the Occupant Restraint Controller (ORC). Was the DRB able to communicate with any of the modules listed? Yes → Go To 2 No → Go To 3	All
2	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: If the DRB can not communicate with a single module, refer to the category list for the related symptom.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Body Verification Test - Ver 1. No → Test Complete.	All
3	Attempt to start the vehicle. Does the vehicle start and continue to run? Yes → Go To 4 No → Go To 6	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the BCM ″C1″ harness connector. Measure the resistance of the PCI Bus (DLC) circuit between the DLC connector and the BCM ″C1″ connector cavity 14. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the PCI Bus (DLC) circuit for an open. Perform the Body Verification Test - Ver 1.	All
5	If there are no possible causes remaining, replace the BCM. View repair options. Repair Replace the BCM. Perform the Body Verification Test - Ver 1.	All
6	**Note: Reconnect any previously disconnected components or connectors.** Turn the ignition on. Measure the voltage of the PCI Bus circuit (DLC) in the Data Link connector. Is the voltage steadily above 7.0 volts? Yes → Go To 7 No → Go To 9	All
7	**Note: Determine which modules this vehicle is equipped with before beginning.** Turn the ignition off. Disconnect the BCM harness connectors and remove the Body Control Module from the Junction Block. Turn the ignition on. Measure the voltage of each PCI Bus circuit at the BCM ″C1″, ″C3″, ″C4″ connectors and at the Junction Block Body Control Module connector cavity 10. Is the voltage steadily above 7.0 volts for any measurement? Yes → Go To 8 No → Replace the Body Control Module. Perform the Body Verification Test - Ver 1.	All
8	Turn the ignition off. Disconnect the module that corresponds to the PCI Bus circuit that measured steadily above 7.0 volts. Turn the ignition on. **Note: If the PCI Bus circuit for the Occupant Restraint Controller was above 7.0 volts and is equipped with side airbags, disconnect each module one at a time.** Measure the voltage of the PCI Bus circuit that previously measured above 7.0 volts. Is the voltage steadily above 7.0 volts with the module disconnected? Yes → Repair the PCI Bus circuit that measured over 7.0 volts for a short to voltage. Perform the Body Verification Test - Ver 1. No → Replace the module that caused the short to voltage on the PCI Bus circuit. Perform the Body Verification Test - Ver 1.	All

*PCI BUS COMMUNICATION FAILURE — Continued

TEST	ACTION	APPLICABILITY
9	**Note: Determine which modules this vehicle is equipped with before beginning.** Turn the ignition off. Disconnect the negative battery cable. Disconnect the BCM harness connectors and remove the Body Control Module from the Junction Block. Measure the resistance between ground and each of the PCI Bus circuits at the BCM ″C1″, ″C3″, ″C4″ connectors and at the Junction Block Body Control Module connector cavity 10. Is the resistance below 100.0 ohms for any of the measurements? Yes → Go To 10 No → Replace the Body Control Module. Perform the Body Verification Test - Ver 1.	All
10	Turn the ignition off. Disconnect the negative battery cable. Disconnect the module that corresponds to the PCI Bus circuit that resistance measured below 100.0 ohms. **Note: If the PCI Bus circuit for the Occupant Restraint Controller was below 100.0 ohm and is equipped with side airbags, disconnect each module one at a time.** Measure the resistance between ground and the PCI Bus circuit that previously measured below 100.0 ohms. Is the resistance below 100.0 ohms with the module disconnected? Yes → Repair the PCI Bus circuit that resistance measured below 100.0 ohms for a short to ground. Perform the Body Verification Test - Ver 1. No → Replace the module that caused the short to ground on the PCI Bus circuit. Perform the Body Verification Test - Ver 1.	All

Symptom:

P0106-BAROMETRIC PRESSURE OUT OF RANGE

When Monitored and Set Condition:

P0106-BAROMETRIC PRESSURE OUT OF RANGE

When Monitored: With the ignition key on at less than 350 milliseconds and engine speed at less than 255 RPM.

Set Condition: The PCM senses the voltage from the MAP sensor to be less than 2.196 volts but above 0.019 volts for 300 milliseconds.

POSSIBLE CAUSES
MAP SENSOR WIRING HARNESS INTERMITTENT
MAP SENSOR WIRING HARNESS OBSERVABLE PROBLEM
MAP SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
MAP SENSOR SIGNAL CIRCUIT HIGH RESISTANCE TO GROUND
MAP SENSOR SIGNAL CIRCUIT OPEN
MAP SENSOR
PCM
PCM DEFECTIVE

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 12	All
2	Turn ignition on. With the DRB, read the MAP Sensor Voltage. Is the voltage below 2.2 volts? Yes → Go To 3 No → Go To 12	All

P0106-BAROMETRIC PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the MAP Sensor Connector. Turn ignition on. With the DRB, monitor the MAP Sensor Voltage. Cycle the ignition switch from off to on. Is the voltage above 4.9 volts? Yes → Go To 4 No → Go To 8	All
4	Turn ignition on. Disconnect the MAP Sensor Connector. With a voltmeter, measure the 5 Volt Supply at the MAP Sensor Connector. Is the voltage above 4.0 volts? Yes → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the MAP Sensor 5-Volt Supply Circuit from the MAP Sensor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open 5-Volt Supply Circuit. Perform the Powertrain Verification Test - Ver 5.	All
6	Turn ignition off. Disconnect the MAP Sensor Electrical Connector. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the MAP Sensor 5-Volt Supply Circuit for resistance to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5-Volt Supply Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 7	All
7	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Test Verification VER-5A.	All

P0106-BAROMETRIC PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor Connector. Turn ignition on. With the DRB, monitor the MAP Sensor Voltage. Cycle the ignition switch from off to on. Is the voltage between 2.2 and 4.9 volts? Yes → Repair the high resistance to ground in the MAP sensor signal circuit. Perform Powertrain Test Verification VER-5A. No → Go To 9	All
9	Turn ignition off. Disconnect the PCM. Disconnect the MAP Sensor Electrical Connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, Measure the MAP Sensor Signal Circuit for resistance between the PCM Connector and the MAP Sensor Connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open MAP Sensor Signal Circuit. Perform Powertrain Test Verification VER-5A.	All
10	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure resistance between the MAP Sensor Signal Circuit and the MAP Sensor Ground Circuit. Is the resistance below 5.0 ohms? Yes → Repair MAP Sensor Signal Circuit shorted to MAP Sensor Ground Circuit. Perform Powertrain Test Verification VER-5A. No → Go To 11	All
11	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Test Verification VER-5A.	All
12	Turn ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Test Verification VER-5A. No → Go To 13	All

P0106-BAROMETRIC PRESSURE OUT OF RANGE — Continued

TEST	ACTION	APPLICABILITY
13	**Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start engine. With the DRB, read the MAP Sensor voltage. Wiggle MAP Sensor Connector & Harness. Monitor the DRB display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform Powertrain Test Verification VER-5A. No → Test Complete.	All

Symptom:

P0107-MAP SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0107-MAP SENSOR VOLTAGE TOO LOW

When Monitored: With the engine RPM above 416 but less than 1500, the TPS voltage less than 1.13 volts, and battery voltage greater than 10.4 volts.

Set Condition: The MAP sensor signal voltage is below 0.1 volt for 2.0 seconds with the engine running.

POSSIBLE CAUSES
MAP SENSOR WIRING HARNESS INTERMITTENT
MAP SENSOR WIRING HARNESS OBSERVABLE PROBLEM
MAP SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
MAP SENSOR
PCM (5-VOLT SUPPLY)
PCM (SIGNAL CIRCUIT)

TEST	ACTION	APPLICABILITY
1	Start engine. Let engine idle. With the DRB, read the MAP Sensor voltage. Is the MAP Sensor voltage below 0.6 volts? Yes → Go To 3 No → Go To 2	All
2	Ignition On, Engine Not Running. With the DRB, read the MAP Sensor voltage. Is the MAP Sensor voltage below 3.19 volts? Yes → Go To 3 No → Go To 11	All

P0107-MAP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the MAP Sensor Electrical Connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Use a Voltmeter in the following step. Measure the MAP Sensor 5-Volt Supply Circuit. Is the voltage above 4.5 volts? Yes → Go To 4 No → Go To 8	All
4	Turn ignition off. Disconnect the MAP Sensor Electrical Connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Use the DRB to read MAP Sensor voltage. Is the MAP Sensor voltage above 4.5 volts? Yes → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A. No → Go To 5	All
5	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure resistance between the MAP Sensor Signal Circuit and the MAP Sensor Ground Circuit. Is the resistance below 5.0 ohms? Yes → Repair MAP Sensor Signal Circuit shorted to MAP Sensor Ground Circuit. Perform Powertrain Test Verification VER-5A. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness Connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure resistance of MAP Sensor Signal circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the MAP Sensor Signal Circuit for a short to ground. Perform Powertrain Test Verification VER-5A. No → Go To 7	All
7	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Test Verification VER-5A.	All

P0107-MAP SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the MAP Sensor 5-Volt Supply Circuit from the MAP Sensor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair the open 5-Volt Supply Circuit. Perform the Powertrain Verification Test - Ver 5.	All
9	Turn ignition off. Disconnect the MAP Sensor Electrical Connector. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the MAP Sensor 5-Volt Supply Circuit for resistance to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5-Volt Supply Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 10	All
10	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Test Verification VER-5A.	All
11	Turn ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Test Verification VER-5A. No → Go To 12	All
12	**Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start engine. With the DRB, read the MAP Sensor voltage. Wiggle MAP Sensor Connector & Harness. Monitor the DRB display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform Powertrain Test Verification VER-5A. No → Test Complete.	All

Symptom:

P0108-MAP SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0108-MAP SENSOR VOLTAGE TOO HIGH

When Monitored: With the engine RPM above 400, the TP sensor voltage less than 1.13 volt, and battery voltage greater than 10.4 volts

Set Condition: The MAP sensor signal voltage is greater than 4.88 volts at start or with the engine running for 2.2 seconds.

POSSIBLE CAUSES
MAP SENSOR GROUND CIRCUIT OPEN
MAP SENSOR WIRING HARNESS INTERMITTENT
MAP SENSOR WIRING HARNESS OBSERVABLE PROBLEM
MAP SENSOR SIGNAL CIRCUIT SHORTED TO BATTERY VOLTAGE
MAP SENSOR SIGNAL CIRCUIT OPEN
MAP SENSOR SIGNAL CIRCUIT SHORTED TO 5-VOLT SUPPLY CIRCUIT
MAP SENSOR
PCM (MAP SENSOR VOLTAGE TOO HIGH)

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRB, read the MAP Sensor voltage. Is the MAP Sensor voltage above 4.6 volts? Yes → Go To 2 No → Go To 8	All
2	Ignition Off. Disconnect the MAP Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Connect a jumper wire between the Sensor Signal and Sensor Ground Circuits. Turn ignition on, engine off. With the DRB, read the MAP Sensor voltage. Is the voltage below 1.0 volt? Yes → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A. No → Go To 3	All

P0108-MAP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Ignition Off Disconnect the MAP Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on,Engine not running. Using a Voltmeter measure the voltage of the MAP Sensor Signal Circuit at the MAP Sensor Connector. Is the voltage above 5.5 volts? Yes → Repair the MAP Sensor Signal shorted to battery voltage. Perform Powertrain Test Verification VER-5A. No → Go To 4	All
4	Turn ignition off. Disconnect the MAP Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the MAP Sensor Signal Circuit to 5-volt Supply Circuit. Is the resistance below 5.0 ohms? Yes → Repair MAP Sensor Signal Circuit shorted to 5-volt Supply Circuit. Perform Powertrain Test Verification VER-5A. No → Go To 5	All
5	Turn ignition off. Disconnect the MAP Sensor Electrical Connector. Disconnect the PCM Connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Sensor Ground Circuit between the MAP Sensor and the Powertrain Control Module. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open MAP Sensor Ground Circuit. Perform the Powertrain Verification Test - Ver 5.	All
6	Turn ignition off. Disconnect the PCM. Disconnect the MAP Sensor Electrical Connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, Measure the MAP Sensor Signal Circuit for resistance between the PCM Connector and the MAP Sensor Connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open MAP Sensor Signal Circuit. Perform Powertrain Test Verification VER-5A.	All
7	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the PCM. Perform Powertrain Test Verification VER-5A.	All

P0108-MAP SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Test Verification VER-5A. No → Go To 9	All
9	**Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start engine. With the DRB, read the MAP Sensor voltage. Wiggle MAP Sensor Connector & Harness. Monitor the DRB display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform Powertrain Test Verification VER-5A. No → Test Complete.	All

Symptom:

P0112-INTAKE AIR TEMP SENSOR VOLTAGE LOW

When Monitored and Set Condition:

P0112-INTAKE AIR TEMP SENSOR VOLTAGE LOW

When Monitored: With the ignition on and battery voltage greater than 10.4 volts.

Set Condition: The Intake Air Temperature (IAT) sensor circuit voltage at the PCM goes below 0.8 volt.

POSSIBLE CAUSES
IAT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
IAT SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
IAT SENSOR
POWERTRAIN CONTROL MODULE
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P0112? Yes → Go To 2 No → Go To 6	All
2	Turn Ignition On. With the DRB, read the ″Intake Air Tmp Volt″ value. Turn the ignition off. Disconnect the IAT harness connector. Turn the ignition on. With the DRB in sensors, read the ″Intake Air Tmp Volt″ value. Did the ″Intake Air Tmp Volt″ value change from below 1.0 volt to above 4.5 volts? No → Go To 3 Yes → Replace the IAT Sensor. Perform the Powertrain Verification Test - Ver 5.	All
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connectors. Using an Ohmmeter, measure the resistance between the IAT Sensor Signal circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the short to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 4	All

P0112-INTAKE AIR TEMP SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connectors. Using an Ohmmeter, measure the resistance between the IAT Sensor Signal circuit and the Sensor Ground circuit at the IAT Sensor connector. Is the resistance below 5.0 ohms? Yes → Repair the shorted circuit. Perform the Powertrain Verification Test - Ver 5. No → Go To 5	All
5	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
6	Turn ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
P0113-INTAKE AIR TEMP SENSOR VOLTAGE HIGH

When Monitored and Set Condition:

P0113-INTAKE AIR TEMP SENSOR VOLTAGE HIGH

When Monitored: With the ignition on and battery voltage greater than 10.4 volts.

Set Condition: The intake air temperature (IAT) sensor circuit voltage at the PCM goes above 4.9 volts.

POSSIBLE CAUSES
SENSOR GROUND CIRCUIT OPEN
IAT SENSOR SIGNAL CIRCUIT OPEN
IAT SENSOR
IAT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
POWERTRAIN CONTROL MODULE
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P0113? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the IAT Sensor harness connector. Start the engine, and allow it to idle. Using a Voltmeter, measure the IAT Sensor Signal circuit voltage at the IAT Sensor connector. Is the voltage above 5.5 volts? Yes → Repair the short to voltage. Perform the Powertrain Verification Test - Ver 5. No → Go To 3	All

P0113-INTAKE AIR TEMP SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the IAT Sensor harness connector. Turn the ignition on. With the DRB in sensors, read the ″Intake Air Tmp Volt″ value. Connect a jumper wire between the IAT Sensor Signal Circuit and the Sensor Ground Circuit at the IAT Sensor connector. Voltage should change from greater than 4.5 volts to less than 1.0 volt. Did the ″Intake Air Tmp Volt″ value change from greater than 4.5 volts to less than 1.0 volt? Yes → Replace the IAT Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the IAT Sensor harness connector. Using an Ohmmeter, measure the resistance between the Sensor Ground circuit and ground at the IAT Sensor connector. Is the resistance below 5.0 ohms? No → Repair the open Sensor Ground circuit. Perform the Powertrain Verification Test - Ver 5. Yes → Go To 5	All
5	Turn the ignition off. Disconnect the IAT Sensor harness connector. Disconnect the PCM harness connectors. Using an Ohmmeter, measure the resistance of the IAT Sensor Signal circuit from the IAT Sensor connector to the PCM connector. Is the resistance below 5.0 ohms? No → Repair the open circuit. Perform the Powertrain Verification Test - Ver 5. Yes → Go To 6	All
6	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
7	Turn ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:

P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0117-ECT SENSOR VOLTAGE TOO LOW

When Monitored: With the ignition on and battery voltage greater than 10.4 volts.

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM goes below 0.8 volt for more than 3 seconds.

POSSIBLE CAUSES
ECT SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
ECT SENSOR SIGNAL CIRCUIT SHORTED TO THE SENSOR GROUND CIRCUIT
ECT WIRING HARNESS INTERMITTENT
ECT SENSOR
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P0117? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connectors. Using an Ohmmeter, measure the resistance between the ECT Sensor Signal Circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the short to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 3	All
3	Turn Ignition On. With the DRB in sensors, read the ″Eng Coolant Tmp Vlt″ value. Disconnect the ECT Sensor harness connector. Did the ″Eng Coolant Tmp Vlt″ value change from below 1.0 volt to above 4.5 volts? Yes → Replace the ECT Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 4	All

P0117-ECT SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connectors. Using an Ohmmeter, measure the resistance between the ECT Sensor Signal circuit and the Sensor Ground circuit at the ECT Sensor connector. Is the resistance below 5.0 ohms? Yes → Repair the shorted circuit. Perform the Powertrain Verification Test - Ver 5. No → Go To 5	All
5	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
6	Turn ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored and Set Condition:

P0118-ECT SENSOR VOLTAGE TOO HIGH

When Monitored: With the ignition on and battery voltage greater than 10.4 volts.

Set Condition: The Engine Coolant Temperature (ECT) sensor circuit voltage at the PCM goes above 4.98 volts for more than 3 seconds.

POSSIBLE CAUSES
SENSOR GROUND CIRCUIT OPEN
ECT SENSOR SIGNAL CIRCUIT OPEN
ECT SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
ECT WIRING HARNESS INTERMITTENT
ECT SENSOR
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P0118? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the ECT Sensor harness connector. Using an Ohmmeter, measure the resistance between the Sensor Ground circuit and ground (B-) at the ECT Sensor connector. Is the resistance below 5.0 ohms? No → Repair the open circuit. Perform the Powertrain Verification Test - Ver 5. Yes → Go To 3	All
3	Turn the ignition off. Disconnect the ECT Sensor harness connector. Disconnect the PCM harness connectors. Using an Ohmmeter, measure the resistance of the ECT Sensor Signal circuit from the ECT Sensor connector to the PCM connector. Is the resistance below 5.0 ohms? No → Repair the open circuit. Perform the Powertrain Verification Test - Ver 5. Yes → Go To 4	All

P0118-ECT SENSOR VOLTAGE TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the ECT harness connector. Start the engine. Allow engine to idle. Using a Voltmeter, measure the ECT Signal wire voltage at the ECT connector. Is the voltage above 5.5 volts? Yes → Repair the short to voltage. Perform the Powertrain Verification Test - Ver 5. No → Go To 5	All
5	Turn the ignition off. Disconnect the ECT Sensor harness connector. Turn the ignition on. With the DRB in sensors, read the ″Eng Coolant Tmp Vlt″ value. Connect a jumper wire between the ECT Sensor Signal Circuit and the Sensor Ground Circuit at the ECT Sensor connector. Voltage should change from greater than 4.5 volts to less than 1.0 volt. Did the ″Eng Coolant Tmp Vlt″ value change from greater than 4.5 volts to less than 1.0 volt? Yes → Replace the ECT Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 6	All
6	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
7	Turn ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP

When Monitored and Set Condition:

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP

When Monitored: With the engine running and no MAP Sensor or TP Sensor DTC's set. Engine speed must be greater than 1600 RPM.

Set Condition: When the manifold vacuum is low, the TP sensor signal should be high. Conversely, when manifold vacuum is high, the TP sensor signal should be low. If the MAP Sensor and TP Sensor do not respond within 4 seconds as stated above, a DTC will be set.

POSSIBLE CAUSES
MAP SENSOR VACUUM PORT
THROTTLE POSITION SENSOR VOLTAGE > 1.0 VOLT)
TPS VOLTAGE CHANGE NOT SMOOTH
TPS HARNESS/CONNECTORS OBSERVABLE (E)
MAP SENSOR WIRING HARNESS INTERMITTENT
MAP SENSOR WIRING HARNESS OBSERVABLE PROBLEM
THROTTLE BODY INSPECTION
TPS 5-VOLT SUPPLY CIRCUIT OPEN
TPS 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
THROTTLE POSITION SENSOR
THROTTLE POSITION SENSOR (VOLTAGE > 1.0 VOLT)
POWERTRAIN CONTROL MODULE
MAP SENSOR

TEST	ACTION	APPLICABILITY
1	**Note: Diagnose any MAP sensor, TPS or Vehicle Speed sensor trouble codes before continuing.** Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P0121? Yes → Go To 2 No → Go To 16	All
2	Ignition Off Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Verification Test VER-5. No → Go To 3	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition on. Using the DRB, monitor the MAP sensor voltage. Start the engine and allow it to idle. Did the MAP sensor voltage drop from above 3.5 volts to below 2.0 volts? No → Inspect the MAP sensor vacuum port for any blockage. If OK, replace the MAP sensor. Perform Powertrain Verification Test VER-5A. Yes → Go To 4	All
4	Check the throttle plate and linkage for a binding condition. Disconnect the TP sensor. Inspect TP sensor wire colors for the correct cavities. **Note: Check connectors - Clean/repair as necessary.** Were any proplems found? Yes → Repair as necessary. Perform Powertrain Verification Test VER-5. No → Go To 5	All
5	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 6 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
6	Turn the ignition off. Disconnect the TP sensor harness connector. Turn the ignition on. Turn the ignition off. With the DRB, read the Throttle Position Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 7	All
7	Ignition Off. Tee in a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB, read the MAP Sensor vacuum. Is the reading within 1″ of the teed-in Vacuum Gauge? Yes → Go To 8 No → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A.	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Throttle Position Sensor. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Using a Voltmeter, measure the Throttle Position Sensor 5-Volt Supply Circuit at the TPS Connector. Is the voltage below 4.0 volts? Yes → Go To 9 No → Go To 13	All
9	Turn the ignition on. With the DRB, read the Throttle Position Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 10	All
10	Ignition On, Engine Not Running. With the DRB, read the ″TPS Volt″. Open the Throttle Plate to wide open throttle. Is the Throttle Position Sensor voltage above 3.5 volts? Yes → Go To 11 No → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5.	All
11	Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Using an ohmmeter, measure the resistance of the TPS 5-Volt Supply Circuit between the TPS connector and ground. Is the resitance below 5.0 ohms? Yes → Repair the TPS 5-Volt Supply Circuit for a short to ground. Perform Powertrain Verification Test VER-5A. No → Go To 12	All
12	Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Using an ohmmeter, measure the resistance of the TPS 5-Volt Supply Circuit between the TPS and the PCM harness conectors. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the open TPS 5-Volt Supply Circuit. Perform Powertrain Verification Test VER-5A.	All
13	Turn the ignition on. With the DRB, read the Throttle Position Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 14	All

P0121-TPS VOLTAGE DOES NOT AGREE WITH MAP — Continued

TEST	ACTION	APPLICABILITY
14	Ignition On, Engine Not Running. With the DRB, read the ″TPS Volt″. Open the Throttle Plate to wide open throttle. Is the Throttle Position Sensor voltage above 3.5 volts? Yes → Go To 15 No → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5.	All
15	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
16	Turn ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Test Verification VER-5A. No → Go To 17	All
17	**Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start engine. With the DRB, read the MAP Sensor voltage. Wiggle MAP Sensor Connector & Harness. Monitor the DRB display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform Powertrain Test Verification VER-5A. No → Test Complete.	All

Symptom:
P0122-THROTTLE POSITION SENSOR VOLTAGE LOW

When Monitored and Set Condition:

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW

When Monitored: With the ignition on and battery voltage above 10.4 volts.

Set Condition: Throttle Position Sensor voltage at the PCM is 0.1 volt for 1.3 seconds.

POSSIBLE CAUSES
TRANS CONTROL MODULE
TPS VOLTAGE CHANGE NOT SMOOTH
TPS CONNECTORS/HARNESS INTERMITTENT (D)
TPS HARNESS/CONNECTORS INTERMITTENT (C)
TPS HARNESS/CONNECTORS OBSERVABLE (E)
TPS 5-VOLT SUPPLY CIRCUIT OPEN
TPS 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
TPS SIGNAL CIRCUIT SHORTED TO GROUND
TPS SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
THROTTLE POSITION SENSOR (VOLTAGE > 1.0 VOLT)
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running. With the DRB, read the Throttle Position Sensor (TP Sensor) voltage. Is the Throttle Position Sensor voltage below 0.2 volt? Yes → Go To 2 No → Go To 10	All
2	Turn the ignition off. Disconnect the TP sensor harness connector. Turn the ignition on. Turn the ignition off. With the DRB, read the Throttle Position Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 3	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Throttle Position Sensor. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Using a Voltmeter, measure the Throttle Position Sensor 5-Volt Supply Circuit at the TPS Connector. Is the voltage below 4.0 volts? Yes → Go To 4 No → Go To 6	All
4	Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Using an ohmmeter, measure the resistance of the TPS 5-Volt Supply Circuit between the TPS connector and ground. Is the resitance below 5.0 ohms? Yes → Repair the TPS 5-Volt Supply Circuit for a short to ground. Perform Powertrain Verification Test VER-5A. No → Go To 5	All
5	Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Using an ohmmeter, measure the resistance of the TPS 5-Volt Supply Circuit between the TPS and the PCM harness conectors. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open TPS 5-Volt Supply Circuit. Perform Powertrain Verification Test VER-5A.	All
6	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the TP Sensor Signal Circuit to ground at the PCM connector. Is the resistance below 5.0 ohms? Yes → Repair the Throttle Position Sensor Signal Circuit for a short to ground. Perform Powertrain Verification Test VER-5. No → Go To 7	All
7	Turn the ignition off. Disconnect the Trans Control Module harness connector. Turn the ignition on. Using a DRB, monitor the TP sensor voltage. Is the voltage above 4.0 volts? Yes → Replace the Transmission Control Module. Perform Powertrain Verification Test VER-5. No → Go To 8	All

P0122-THROTTLE POSITION SENSOR VOLTAGE LOW — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the Powertrain Control Module connector harness. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance between the Sensor Signal Circuit and the Sensor Ground Circuit at the PCM connector. Is the resistance below 5.0 ohms? Yes → Repair the Sensor Signal Circuit shorted to Sensor Ground Circuit. Perform Powertrain Verification Test VER-5. No → Go To 9	All
9	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
10	Engine Running. **Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Wiggle the Throttle Position Sensor Connectors and Harness. Monitor engine RPM. Was there any change in engine RPM when wiggled? Yes → Repair the Harness or Connector that caused the engine RPM to change. Perform Powertrain Verification Test VER-5. No → Go To 11	All
11	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 12 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
12	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Wiggle the Throttle Position Sensor Connectors and Harness. Monitor the DRB display. Was there any change in Throttle Position Sensor voltage when wiggled? Yes → Repair the Harness or Connector that caused the voltage change. Perform Powertrain Verification Test VER-5. No → Go To 13	All
13	Ignition Off Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Verification Test VER-5. No → Test Complete.	All

Symptom:
P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH

When Monitored and Set Condition:

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH

When Monitored: With the ignition on and battery voltage above 10.4 volts.

Set Condition: Throttle Position Sensor voltage at the PCM goes above 4.5 volts for 3.2 seconds.

POSSIBLE CAUSES
TRANS CONTROL MODULE
TPS VOLTAGE CHANGE NOT SMOOTH
TPS CONNECTORS/HARNESS INTERMITTENT (D)
TPS HARNESS/CONNECTORS INTERMITTENT (C)
TPS HARNESS/CONNECTORS OBSERVABLE (E)
THROTTLE POSITION SENSOR GROUND CIRCUIT OPEN
TPS SIGNAL OR S/C SWITCH SIGNAL CIRCUIT SHORTED TO VOLTAGE
THROTTLE POSITION SENSOR SIGNAL CIRCUIT OPEN
TPS SIGNAL CIRCUIT SHORTED TO 5-VOLT SUPPLY CIRCUIT
TPS (VOLTAGE < 1.0 VOLT)
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running. With the DRB, read the Throttle Position Sensor voltage. Is the Throttle Position Sensor voltage above 4.5 volts? Yes → Go To 2 No → Go To 9	All
2	Turn the ignition off. Disconnect the TPS Connector harness connector. Disconnect the PCM Connector harness connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Sensor Ground Circuit between the TPS and the Powertrain Control Module harness connectors. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open TP Sensor Ground Circuit. Perform the Powertrain Verification Test - Ver 5.	All

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
3	Turn the igntion off. Disconnect the Throttle Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. With a Voltmeter, measure the Throttle Position Sensor Signal Circuit. Is the voltage above 5.5 volts? Yes → Repair the TP Sensor Signal Circuit shorted to voltage. Perform Powertrain Verification Test VER-5. No → Go To 4	All
4	Ignition Off. Disconnect the Throttle Position Sensor harness connector. Disconnect the PCM harness connector. Using an ohmmeter, measure the resistance between the TP Sensor Signal Circuit and the 5 Volt Supply Circuit at the TPS. Is the resistance below 5.0 ohms? Yes → Repair the TP Sensor Signal Circuit shorted to the 5-Volt Supply Circuit. Perform Powertrain Verification Test VER-5. No → Go To 5	All
5	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition on. Using the DRB, read the Throttle Position Sensor voltage. Connect a jumper wire between the TP Sensor Signal circuit and Sensor Ground circuit. Is the voltage below 1.0 volt? Yes → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 6	All
6	Turn the ignition off. Disconnect the Trans Control Module harness connector. Turn the ignition on. Using a DRB, monitor the TP sensor voltage. Is the voltage above 4.9 volts? Yes → Go To 7 No → Replace the Transmission Control Module. Perform Powertrain Verification Test VER-5.	All
7	Ignition Off. Disconnect the Throttle Position Sensor. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure resistance of TP Sensor Signal circuit from PCM to TP Sensor Connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open TP Sensor Signal Circuit. Perform Powertrain Verification Test VER-5.	All

P0123-THROTTLE POSITION SENSOR VOLTAGE HIGH — Continued

TEST	ACTION	APPLICABILITY
8	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
9	Engine Running. **Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Wiggle the Throttle Position Sensor Connectors and Harness. Monitor engine RPM. Was there any change in engine RPM when wiggled? Yes → Repair the Harness or Connector that caused the engine RPM to change. Perform Powertrain Verification Test VER-5. No → Go To 10	All
10	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 11 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
11	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Wiggle the Throttle Position Sensor Connectors and Harness. Monitor the DRB display. Was there any change in Throttle Position Sensor voltage when wiggled? Yes → Repair the Harness or Connector that caused the voltage change. Perform Powertrain Verification Test VER-5. No → Go To 12	All
12	Ignition Off Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Verification Test VER-5. No → Test Complete.	All

Symptom List:

P0125-CLOSED LOOP TEMP NOT REACHED
P1281-ENGINE IS COLD TOO LONG

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0125-CLOSED LOOP TEMP NOT REACHED.

When Monitored and Set Condition:

P0125-CLOSED LOOP TEMP NOT REACHED

When Monitored: With battery voltage greater than 10.4 volts, after engine is started, for ten minutes.

Set Condition: The engine temperature does not go above 18 deg. F by 10 minutes after the engine is started. Two trips are required to set this DTC.

P1281-ENGINE IS COLD TOO LONG

When Monitored: The ignition key on, engine running.

Set Condition: The engine does not warm to 176 deg. F while driving for 20 minutes after start.

POSSIBLE CAUSES
LOW COOLANT LEVEL
THERMOSTAT
ECT SENSOR (OUT OF CALIBRATION)/HIGH RESISTANCE IN RELATED CIRCUIT

TEST	ACTION	APPLICABILITY
1	**Note: The best way to diagnose this DTC is to allow the vehicle to sit overnight outside in order to have a totally cold soaked engine.** **Note: Extremely cold outside ambient temperatures may have caused this DTC to set.** **Warning: Never open the cooling system when the engine is hot. The system is under pressure. Extreme burns or scalding may result. Allow the engine to cool before opening the cooling system.** Check the coolant system to make sure that the coolant is in good condition and at the proper level. Is the coolant level and condition OK? Yes → Go To 2 No → Adjust coolant level as necessary. Perform verification test Ver-2A	All

P0125-CLOSED LOOP TEMP NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
2	**Note: This test works best if performed on a cold engine (cold soak)** Turn the ignition on. With the DRB in sensors, read the ″Eng Coolant Tmp Deg″ value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ″Eng Coolant Tmp Deg″ value. The temp deg value change should be a smooth transition from start up to normal operating temp (180°). Also monitor the actual coolant temperature with a thermometer. **Note: As the engine warms up to operating temperature, the actual coolant temperature (thermometer reading) and the ″Eng Coolant Tmp Deg″ (DRB) values should stay relatively close to each other.** Using the appropriate service information, determine the proper opening temperature of the thermostat. Did the thermostat open at the proper temperature? Yes → Go To 3 No → Replace the thermostat. Perform verification test Ver-2A	All
3	Was the ″Eng Coolant Tmp Deg″ value increase a smooth transition and did it reach at least 180°? Yes → Test Complete. No → Check the ECT wiring for a high resistance condition (voltage drop). If OK, replace the Engine Coolant Temperature Sensor. Perform the Powertrain Verification Test - Ver 5.	All

Symptom List:

P0131-1/1 O2 SENSOR SHORTED TO GROUND
P0137-1/2 O2 SENSOR SHORTED TO GROUND
P0151-2/1 O2 SENSOR SHORTED TO GROUND
P0157-2/2 O2 SENSOR SHORTED TO GROUND

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0131-1/1 O2 SENSOR SHORTED TO GROUND.

When Monitored and Set Condition:

P0131-1/1 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 98°F, ambient/battery sensor reading within 27°F, and engine coolant temperature above 170°F on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

P0137-1/2 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 98°F, ambient/battery sensor reading within 27°F, and engine coolant temperature above 170°F on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

P0151-2/1 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 98°F, ambient/battery sensor reading within 27°F, and engine coolant temperature above 170°F on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

P0157-2/2 O2 SENSOR SHORTED TO GROUND

When Monitored: At a cold start, engine coolant below 98°F, ambient/battery sensor reading within 27°F, and engine coolant temperature above 170°F on the previous key off.

Set Condition: The oxygen sensor signal voltage is below 0.156 volts for 28 seconds after starting engine.

POSSIBLE CAUSES
O2S SIGNAL CIRCUIT SHORT TO GROUND
O2S SIGNAL CIRCUIT SHORT TO SENSOR GROUND CIRCUIT
WIRING HARNESS INTERMITTENT

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

POSSIBLE CAUSES
O2 SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition on. With the DRB, monitor the O2S Signal voltage. Disconnect the O2 sensor harness connector. Does the O2S sensor signal voltage read above 0.16 volts? Yes → Replace the O2 Sensor. Perform Powertrain Verification Test VER-5A. No → Go To 3	All
3	Turn Ignition Off. Disconnect the O2S connector. Disconnect the PCM connectors. Using an Ohmmeter, measure the resistance between the O2S Signal circuit and Engine ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground. Perform Powertrain Verification Test VER-5A. No → Go To 4	All
4	Turn Ignition Off. Disconnect the O2S connector. Disconnect the PCM connectors. Using an Ohmmeter, measure the resistance between the O2S Signal circuit and the O2S Sensor ground circuit at the O2S connector. Is the resistance below 5.0 ohms? Yes → Repair the shorted circuits. Perform Powertrain Verification Test VER-5A. No → Go To 5	All
5	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the PCM. Perform Powertrain Verification Test VER-5A.	All

P0131-1/1 O2 SENSOR SHORTED TO GROUND — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-5A. No → Test Complete.	All

Symptom List:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE
P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE
P0152-2/1 O2 SENSOR SHORTED TO VOLTAGE
P0158-2/2 O2 SENSOR SHORTED TO VOLTAGE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE.

When Monitored and Set Condition:

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10.4 volts, engine running for more than 4 minutes and coolant temperature above 180°F.

Set Condition: The oxygen sensor voltage is above 1.5 volts.

P0138-1/2 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10.4 volts, engine running for more than 4 minutes and coolant temperature above 180°F.

Set Condition: The oxygen sensor voltage is above 1.5 volts.

P0152-2/1 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10.4 volts, engine running for more than 4 minutes and coolant temperature above 180°F.

Set Condition: The oxygen sensor voltage is above 1.5 volts.

P0158-2/2 O2 SENSOR SHORTED TO VOLTAGE

When Monitored: With battery voltage greater than 10.4 volts, engine running for more than 4 minutes and coolant temperature above 180°F.

Set Condition: The oxygen sensor voltage is above 1.5 volts.

POSSIBLE CAUSES
O2S SENSOR GROUND CIRCUIT OPEN
O2S SIGNAL CIRCUIT OPEN
O2S SIGNAL CIRCUIT SHORT TO VOLTAGE
WIRING HARNESS INTERMITTENT
O2 SENSOR
PCM

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn the igntion off. Disconnect the O2 sensor harness connector. Start engine. Allow the engine to idle. Monitior the 02 sensor voltage on the DRB. Is the O2 voltage above 1.2 volts? Yes → Go To 3 No → Replace the Oxygen Sensor. Perform Powertrain Verification Test VER-5A.	All
3	Turn Ignition Off. Disconnect the O2S connector. Using an Ohmmeter, measure the resistance between the O2S Sensor Ground circuit and Engine Ground. Is the resistance below 5.0 ohms? No → Repair the open circuit. Perform the Powertrain Verification Test - Ver 5. Yes → Go To 4	All
4	Turn Ignition Off. Disconnect the O2S connector. Start engine. Allow engine to idle. Using a Voltmeter, measure the voltage of the O2S Signal circuit at the O2 Sensor connector. Is the voltage above .9 volts? Yes → Repair the short to voltage. Perform Powertrain Verification Test VER-5A. No → Go To 5	All
5	Turn Ignition Off. Disconnect the O2S connector. Disconnect the PCM connectors. Using an Ohmmeter, measure the resistance of the O2S Signal circuit between the O2S connector and the PCM connector. Is the resistance below 5.0 ohms? No → Repair the open circuit. Perform Powertrain Verification Test VER-5A. Yes → Go To 6	All
6	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the PCM. Perform Powertrain Verification Test VER-5A.	All

P0132-1/1 O2 SENSOR SHORTED TO VOLTAGE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-5A. No → Test Complete.	All

Symptom List:

P0133-1/1 O2 SENSOR SLOW RESPONSE
P0134 - 1/1 O2 SENSOR STAYS AT CENTER
P0139-1/2 O2 SENSOR SLOW RESPONSE
P0140-1/2 O2 SENSOR STAYS AT CENTER
P0153-2/1 O2 SENSOR SLOW RESPONSE
P0154-2/1 02 SENSOR STAYS AT CENTER
P0160-2/2 O2 SENSOR STAYS AT CENTER

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0133-1/1 O2 SENSOR SLOW RESPONSE.

When Monitored and Set Condition:

P0133-1/1 O2 SENSOR SLOW RESPONSE

When Monitored: With ECT greater than 147°F, after reaching a vehicle speed of 10 mph, and the throttle remaining open (off idle) for 2 minutes, bring the vehicle to a stop and allow the engine to idle with the transmission in DRIVE.

Set Condition: The oxygen sensor signal voltage is switching from below 0.27 volts to above 0.62 volts and back fewer times than required.

P0139-1/2 O2 SENSOR SLOW RESPONSE

When Monitored: Engine temp greater than 147°F, vehicle speed greater than 10 mph, throttle off idle for 2 minutes. Bring vehicle to a stop and allow to idle transmission in drive (auto) or in neutral (manual)

Set Condition: The oxygen sensor signal voltage is switching from below 0.27 volts to above .62 volts and back fewer times than required.

P0153-2/1 O2 SENSOR SLOW RESPONSE

When Monitored: With ECT greater than 147°F, after reaching a vehicle speed of 10 mph, and the throttle remaining open (off idle) for 2 minutes, bring the vehicle to a stop and allow the engine to idle with the transmission in DRIVE.

Set Condition: The oxygen sensor signal voltage is switching from below 0.27 volts to above 0.62 volts and back fewer times than required.

POSSIBLE CAUSES
EXHAUST LEAK
O2S SENSOR GROUND CIRCUIT VOLTAGE DROP
O2S SIGNAL CIRCUIT VOLTAGE DROP
WIRING HARNESS INTERMITTENT
O2S

P0133-1/1 O2 SENSOR SLOW RESPONSE — Continued

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Start engine. Allow engine to idle. Check for any exhaust leaks between the Engine and the appropriate O2S. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform the Powertrain Verification Test - Ver 2. No → Go To 3	All
3	Turn ignition off. Using a Voltmeter, backprobe the O2S Ground ckt using one of the meter leads, using the other meter lead backprobe the O2S Ground circuit at the PCM connector. Ensure the voltmeter leads are connected for positive polarity. Start engine. Allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 4 No → Repair high resistance on O2S Sensor Ground circuit. Perform the Powertrain Verification Test - Ver 5.	All
4	Turn ignition off. Using a Voltmeter, backprobe the O2S Signal ckt using one of the meter leads, using the other meter lead backprobe the O2S Signal circuit at the PCM connector. Ensure the voltmeter leads are connected for positive polarity. Start engine. Allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair high resistance on O2S Signal circuit. Perform Powertrain Verification Test VER-5A.	All
5	If there are no potential causes remaining, replace the O2 sensor. View repair options. Repair Replace the O2S. Perform Powertrain Verification Test VER-5A.	All
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-5A. No → Test Complete.	All

Symptom List:

P0135-1/1 O2 SENSOR HEATER FAILURE
P0141-1/2 O2 SENSOR HEATER FAILURE
P0155-2/1 O2 SENSOR HEATER FAILURE
P0161-2/2 O2 SENSOR HEATER FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0135-1/1 O2 SENSOR HEATER FAILURE.

When Monitored and Set Condition:

P0135-1/1 O2 SENSOR HEATER FAILURE

When Monitored: With battery voltage greater than 9 volts, at a cold start, ECT less than 147°F, battery temperature sensor equal to or less than 27°F, and engine at idle for at least 12 seconds.

Set Condition: O2 sensor voltage greater than 3 volts for 30 to 90 seconds.

P0141-1/2 O2 SENSOR HEATER FAILURE

When Monitored: With battery voltage greater than 9 volts, at a cold start, ECT less than 147°F, battery temperature sensor equal to or less than 27°F, and engine at idle for at least 12 seconds.

Set Condition: O2 sensor voltage greater than 3 volts for 30 to 90 seconds.

P0155-2/1 O2 SENSOR HEATER FAILURE

When Monitored: With battery voltage greater than 9 volts, at a cold start, ECT less than 147°F, battery temperature sensor equal to or less than 27°F, and engine at idle for at least 12 seconds.

Set Condition: O2 sensor voltage greater than 3 volts for 30 to 90 seconds.

P0161-2/2 O2 SENSOR HEATER FAILURE

When Monitored: With battery voltage greater than 9 volts, at a cold start, ECT less than 147°F, battery temperature sensor equal to or less than 27°F, and engine at idle for at least 12 seconds.

Set Condition: O2 sensor voltage greater than 3 volts for 30 to 90 seconds.

POSSIBLE CAUSES
OPEN ASD RELAY OUTPUT CIRCUIT
O2S HEATER GROUND CIRCUIT OPEN
WIRING HARNESS INTERMITTENT

P0135-1/1 O2 SENSOR HEATER FAILURE — Continued

POSSIBLE CAUSES
O2S
PCM

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 6	All
2	Turn Ignition Off. Disconnect the O2S connector. Turn Ignition On. With the DRB actuate the O2 HEATER TEST. Using a Voltmeter, measure the voltage at the O2S connector ASD Relay Output circuit. Is the voltage above 11.0 volts? Yes → Go To 3 No → Repair the open circuit. Perform Powertrain Verification Test VER-5A.	All
3	Turn Ignition Off. Disconnect the O2S connector. Using an Ohmmeter, measure the resistance of the O2S Heater Ground circuit to ground. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open ground circuit. Perform Powertrain Verification Test VER-5A.	All
4	Turn Ignition Off. Disconnect the O2S connector. Measurement is taken at the component side of connector. Using an Ohmmeter, measure the resistance between the O2S Heater Feed circuit and the O2S Heater Ground circuit. Is the resistance between 3.0 and 7.0 ohms? Yes → Go To 5 No → Replace the O2S. Perform Powertrain Verification Test VER-5A.	All
5	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the PCM. Perform Powertrain Verification Test VER-5A.	All

P0135-1/1 O2 SENSOR HEATER FAILURE — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-5A. No → Test Complete.	All

Symptom List:

P0171-1/1 FUEL SYSTEM LEAN
P0174-2/1 FUEL SYSTEM LEAN

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0171-1/1 FUEL SYSTEM LEAN.

When Monitored and Set Condition:

P0171-1/1 FUEL SYSTEM LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

P0174-2/1 FUEL SYSTEM LEAN

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and a certain percentage is exceeded for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

POSSIBLE CAUSES
ENGINE MECHANICAL PROBLEM
FUEL FILTER/PRESSURE REGULATOR (HIGH)
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
HIGH RESISTANCE IN THE FUEL PUMP RELAY OUTPUT CIRCUIT
FUEL PUMP INLET STRAINER PLUGGED
TPS VOLTAGE CHANGE NOT SMOOTH
TPS VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
HIGH RESISTANCE IN THE FUEL PUMP GROUND CIRCUIT
FUEL PUMP MODULE
KINKED/RESTRICTED FUEL SUPPLY LINE
ECT SENSOR (OUT OF CALIBRATION)
MAP SENSOR (OUT OF CALIBRATION)

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 19	All
2	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** **Note: 2.7L engines require the use of Miller Tool #6539 (adapter) installed in-line to the fuel supply line. Disconnect the fuel supply line at the fuel rail connection, install tool #6539, then connect a fuel pressure gauge to tool #6539.** **Note: 3.2L/3.5L engines have a pressure test port on the fuel rail. Remove the pressure test port cap at the fuel rail test port. Connect a fuel pressure gauge to the test port pressure fitting on the fuel rail.** Ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 406 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 3 Within Specification Go To 13 Above Specification Replace the fuel filter/pressure regulator. **Caution: Stop All Actuations.**	All
3	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 4 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
4	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 5 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
5	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn Ignition On. With the DRB in sensors, read the ″Eng Coolant Tmp Deg″ value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ″Eng Coolant Tmp Deg″ value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Was the ″Eng Coolant Tmp Deg″ value increase a smooth transition and did it reach at least 180°? Yes → Go To 6 No → Replace the Engine Coolant Temperature Sensor. Perform the Powertrain Verification Test - Ver 5.	All
6	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Turn ignition on. With the DRB, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, check the fuel pump relay output circuit (A141) at connector C308. Does the test light illuminate brightly? Yes → Go To 7 No → Repair the high resistance in the fuel pump relay ouput circuit. Check wire from PDC to fuel pump module connector. Also check for bad relay. Perform Powertrain Verification Test VER-1A. **Caution: Stop All Actuations.**	All
7	Turn ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 8 No → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to B+, check the fuel pump ground circuit (Z1) at connector C308. Does the test light illuminate brightly? Yes → Go To 9 No → Repair the high resistance in the fuel pump ground circuit. Perform Powertrain Verification Test VER-1 **Note: Re-connect connector C308 before performing the next test.**	All
9	Visually inspect the fuel supply line from the fuel tank to the fuel rail. Look for any signs of physical damage that may restrict the supply line. Were any problems found with the fuel supply line? Yes → Repair/replace fuel supply line as necessary. No → Go To 10	All
10	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform the FUEL/MISFIRE VERIFICATION TEST. No → Go To 11	All
11	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. No → Go To 12	All
12	If there are no possible causes remaining, replace the Fuel Pump Module. View repair options. Repair Replace the Fuel Pump Module.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
13	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 14 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
14	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 15 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
15	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn Ignition On. With the DRB in sensors, read the ″Eng Coolant Tmp Deg″ value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ″Eng Coolant Tmp Deg″ value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Was the ″Eng Coolant Tmp Deg″ value increase a smooth transition and did it reach at least 180°? Yes → Go To 16 No → Replace the Engine Coolant Temperature Sensor. Perform the Powertrain Verification Test - Ver 5.	All
16	Turn ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 17 No → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A.	All

P0171-1/1 FUEL SYSTEM LEAN — Continued

TEST	ACTION	APPLICABILITY
17	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform the FUEL/MISFIRE VERIFICATION TEST. No → Go To 18	All
18	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** With the DRB, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Test Complete. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. **Caution: Stop All Actuations.**	All
19	The conditions required to set the DTC are no longer present. With the DRB read and record the Freeze Frame data and the ″Fuel System Similar Conditions Window″ data. Utilize the data and try to duplicate the operating conditions at which the DTC was set. Pay particular attention to the ECT and RPM for added diagnostics. **Note: Refer to any TSB's that may apply to the symptom.** Test Complete Repair Test Complete.	All

Symptom List:

P0172-1/1 FUEL SYSTEM RICH
P0175-2/1 FUEL SYSTEM RICH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0172-1/1 FUEL SYSTEM RICH.

When Monitored and Set Condition:

P0172-1/1 FUEL SYSTEM RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and the result is below a certain value for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

P0175-2/1 FUEL SYSTEM RICH

When Monitored: With the engine running in closed loop mode, the ambient/battery temperature above 20 deg. F and altitude below 8000 ft.

Set Condition: If the PCM multiplies short term compensation by long term adaptive and the result is below a certain value for two trips, a freeze frame is stored, the MIL illuminates and a trouble code is stored.

POSSIBLE CAUSES
ENGINE MECHANICAL PROBLEM
FUEL FILTER/PRESSURE REGULATOR (HIGH)
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
HIGH RESISTANCE IN THE FUEL PUMP RELAY OUTPUT CIRCUIT
FUEL PUMP INLET STRAINER PLUGGED
TPS VOLTAGE CHANGE NOT SMOOTH
TPS VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
HIGH RESISTANCE IN THE FUEL PUMP GROUND CIRCUIT
FUEL PUMP MODULE
KINKED/RESTRICTED FUEL SUPPLY LINE
ECT SENSOR (OUT OF CALIBRATION)
MAP SENSOR (OUT OF CALIBRATION)

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 19	All
2	**Note: Engine must be at operating temp and in closed loop to perform this test.** Start engine and run until operating temp and closed loop mode is reached. With the DRB under System Tests, go to ″Purge Vapors Test″. Observe the Short Term Adaptive value and press 3 to flow. **Note: Short Term Adaptive should change.** Did the Short Term Adaptive value change? Yes → Go To 3 No → Refer to symptom *CHECKING EVAPORATIVE EMISSION SYSTEM in the DRIVEABILITY category.	All
3	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 4 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
4	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** **Note: 2.7L engines require the use of Miller Tool #6539 (adapter) installed in-line to the fuel supply line. Disconnect the fuel supply line at the fuel rail connection, install tool #6539, then connect a fuel pressure gauge to tool #6539.** **Note: 3.2L/3.5L engines have a pressure test port on the fuel rail. Remove the pressure test port cap at the fuel rail test port. Connect a fuel pressure gauge to the test port pressure fitting on the fuel rail.** Ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 406 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 5 Within Specification Go To 14 Above Specification Replace the fuel filter/pressure regulator. **Caution: Stop All Actuations.**	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
5	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 6 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
6	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn Ignition On. With the DRB in sensors, read the ″Eng Coolant Tmp Deg″ value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ″Eng Coolant Tmp Deg″ value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Was the ″Eng Coolant Tmp Deg″ value increase a smooth transition and did it reach at least 180°? Yes → Go To 7 No → Replace the Engine Coolant Temperature Sensor. Perform the Powertrain Verification Test - Ver 5.	All
7	Turn ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 8 No → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Turn ignition on. With the DRB, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, check the fuel pump relay output circuit (A141) at connector C308. Does the test light illuminate brightly? Yes → Go To 9 No → Repair the high resistance in the fuel pump relay ouput circuit. Check wire from PDC to fuel pump module connector. Also check for bad relay. Perform Powertrain Verification Test VER-1A. **Caution: Stop All Actuations.**	All
9	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform the FUEL/MISFIRE VERIFICATION TEST. No → Go To 10	All
10	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to B+, check the fuel pump ground circuit (Z1) at connector C308. Does the test light illuminate brightly? Yes → Go To 11 No → Repair the high resistance in the fuel pump ground circuit. Perform Powertrain Verification Test VER-1 **Note: Re-connect connector C308 before performing the next test.**	All
11	Visually inspect the fuel supply line from the fuel tank to the fuel rail. Look for any signs of physical damage that may restrict the supply line. Were any problems found with the fuel supply line? Yes → Repair/replace fuel supply line as necessary. No → Go To 12	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
12	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. No → Go To 13	All
13	If there are no possible causes remaining, replace the Fuel Pump Module. View repair options. Repair Replace the Fuel Pump Module.	All
14	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 15 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
15	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn Ignition On. With the DRB in sensors, read the ″Eng Coolant Tmp Deg″ value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ″Eng Coolant Tmp Deg″ value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Was the ″Eng Coolant Tmp Deg″ value increase a smooth transition and did it reach at least 180°? Yes → Go To 16 No → Replace the Engine Coolant Temperature Sensor. Perform the Powertrain Verification Test - Ver 5.	All
16	Turn ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Go To 17 No → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A.	All

P0172-1/1 FUEL SYSTEM RICH — Continued

TEST	ACTION	APPLICABILITY
17	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform the FUEL/MISFIRE VERIFICATION TEST. No → Go To 18	All
18	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** With the DRB, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Test Complete. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. **Caution: Stop All Actuations.**	All
19	The conditions required to set the DTC are no longer present. With the DRB read and record the Freeze Frame data and the ″Fuel System Similar Conditions Window″ data. Utilize the data and try to duplicate the operating conditions at which the DTC was set. Pay particular attention to the ECT and RPM for added diagnostics. **Note: Refer to any TSB's that may apply to the symptom.** Test Complete Repair Test Complete.	All

Symptom:
P0201-INJECTOR #1 CONTROL CIRCUIT

When Monitored and Set Condition:

P0201-INJECTOR #1 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
WIRING HARNESS INTERMITTENT
FUEL INJECTOR NO. 1 DRIVER CIRCUIT OPEN
FUEL INJECTOR NO. 1 DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (INJECTOR DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0201? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the fuel injector no. 1 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 1. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the injector connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open/high resistance in the ASD relay output circuit. Note: Check fuse in the PDC. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All

P0201-INJECTOR #1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the fuel injector no. 1 electrical connector. **Note: The next test step requires the use of an analog voltmeter.** **Note: Pay careful attention to the voltmeter needle in order to have valid test results.** Connect the positive lead of the voltmeter to a known good 12 volt source (B+). Connect the negative lead of the voltmeter to the fuel injector no. 1 driver circuit at the fuel injector no. 1 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 1 and observe the voltmeter needle. Does the needle fluctuate? Yes → Go To 4 No → Go To 5 **Stop All Actuations**	All
4	Turn ignition off. If there are no possible causes remaining, replace the fuel injector. View repair options. Repair Replace the fuel injector. Perform the Powertrain Verification Test - Ver 5	All
5	Turn ignition off. Disconnect the fuel injector no. 1 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the fuel injector no. 1 driver circuit from the fuel injector no. 1 connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open fuel injector no. 1 driver circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the fuel injector no. 1 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the fuel injector no. 1 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the injector driver circuit for a short to ground. Note: A shorted injector driver circuit may have ruined the injector also. Injector resistance should be between 10 and 16 ohms. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0201-INJECTOR #1 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the injector wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:

P0202-INJECTOR #2 CONTROL CIRCUIT

When Monitored and Set Condition:

P0202-INJECTOR #2 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
WIRING HARNESS INTERMITTENT
FUEL INJECTOR NO. 2 DRIVER CIRCUIT OPEN
FUEL INJECTOR NO. 2 DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (INJECTOR DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0202? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the fuel injector no. 2 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 2. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the injector connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open/high resistance in the ASD relay output circuit. Note: Check fuse in the PDC. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All

P0202-INJECTOR #2 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the fuel injector no. 2 electrical connector. **Note: The next test step requires the use of an analog voltmeter.** **Note: Pay careful attention to the voltmeter needle in order to have valid test results.** Connect the positive lead of the voltmeter to a known good 12 volt source (B+). Connect the negative lead of the voltmeter to the fuel injector no. 2 driver circuit at the fuel injector no. 2 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 2 and observe the voltmeter needle. Does the needle fluctuate? Yes → Go To 4 No → Go To 5 **Stop All Actuations**	All
4	If there are no possible causes remaining, replace the fuel injector. View repair options. Repair Replace the fuel injector. Perform the Powertrain Verification Test - Ver 5	All
5	Turn ignition off. Disconnect the fuel injector no. 2 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the fuel injector no. 2 driver circuit from the fuel injector no. 2 electrical connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open fuel injector no. 2 driver circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the fuel injector no. 2 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the fuel injector no. 2 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the injector driver circuit for a short to ground. Note: A shorted injector driver circuit may have ruined the injector also. Injector resistance should be between 10 and 16 ohms. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0202-INJECTOR #2 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the injector wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:

P0203-INJECTOR #3 CONTROL CIRCUIT

When Monitored and Set Condition:

P0203-INJECTOR #3 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
WIRING HARNESS INTERMITTENT
FUEL INJECTOR NO. 3 DRIVER CIRCUIT OPEN
FUEL INJECTOR NO. 3 DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (INJECTOR DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0203? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the fuel injector no. 3 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 3. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the injector connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open/high resistance in the ASD relay output circuit. Note: Check fuse in the PDC. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All

P0203-INJECTOR #3 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the fuel injector no. 3 electrical connector. **Note: The next test step requires the use of an analog voltmeter.** **Note: Pay careful attention to the voltmeter needle in order to have valid test results.** Connect the positive lead of the voltmeter to a known good 12 volt source (B+). Connect the negative lead of the voltmeter to the fuel injector no. 3 driver circuit at the fuel injector no. 3 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 3 and observe the voltmeter needle. Does the needle fluctuate? Yes → Go To 4 No → Go To 5 **Stop All Actuations**	All
4	If there are no possible causes remaining, replace the fuel injector. View repair options. Repair Replace the fuel injector. Perform the Powertrain Verification Test - Ver 5	All
5	Turn ignition off. Disconnect the fuel injector no. 3 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the fuel injector no. 3 driver circuit from the fuel injector no. 3 electrical connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open fuel injector no. 3 driver circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the fuel injector no. 3 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the fuel injector no. 3 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the injector driver circuit for a short to ground. Note: A shorted injector driver circuit may have ruined the injector also. Injector resistance should be between 10 and 16 ohms. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0203-INJECTOR #3 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the injector wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P0204-INJECTOR #4 CONTROL CIRCUIT

When Monitored and Set Condition:

P0204-INJECTOR #4 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
WIRING HARNESS INTERMITTENT
FUEL INJECTOR NO. 4 DRIVER CIRCUIT OPEN
FUEL INJECTOR NO. 4 DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (INJECTOR DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0204? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the fuel injector no. 4 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 4. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the injector connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open/high resistance in the ASD relay output circuit. Note: Check fuse in the PDC. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All

P0204-INJECTOR #4 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the fuel injector no. 4 electrical connector. **Note: The next test step requires the use of an analog voltmeter.** **Note: Pay careful attention to the voltmeter needle in order to have valid test results.** Connect the positive lead of the voltmeter to a known good 12 volt source (B+). Connect the negative lead of the voltmeter to the fuel injector no. 4 driver circuit at the fuel injector no. 4 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 4 and observe the voltmeter needle. Does the needle fluctuate? Yes → Go To 4 No → Go To 5 **Stop All Actuations**	All
4	If there are no possible causes remaining, replace the fuel injector. View repair options. Repair Replace the fuel injector. Perform the Powertrain Verification Test - Ver 5	All
5	Turn ignition off. Disconnect the fuel injector no. 4 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the fuel injector no. 4 driver circuit from the fuel injector no. 4 electrical connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open fuel injector no. 4 driver circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the fuel injector no. 4 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the fuel injector no. 4 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the injector driver circuit for a short to ground. Note: A shorted injector driver circuit may have ruined the injector also. Injector resistance should be between 10 and 16 ohms. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0204-INJECTOR #4 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the injector wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:

P0205-INJECTOR #5 CONTROL CIRCUIT

When Monitored and Set Condition:

P0205-INJECTOR #5 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
WIRING HARNESS INTERMITTENT
FUEL INJECTOR NO. 5 DRIVER CIRCUIT OPEN
FUEL INJECTOR NO. 5 DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (INJECTOR DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0205? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the fuel injector no. 5 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 5. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the injector connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open/high resistance in the ASD relay output circuit. Note: Check fuse in the PDC. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All

P0205-INJECTOR #5 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the fuel injector no. 5 electrical connector. **Note: The next test step requires the use of an analog voltmeter.** **Note: Pay careful attention to the voltmeter needle in order to have valid test results.** Connect the positive lead of the voltmeter to a known good 12 volt source (B+). Connect the negative lead of the voltmeter to the fuel injector no. 5 driver circuit at the fuel injector no. 5 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 5 and observe the voltmeter needle. Does the needle fluctuate? Yes → Go To 4 No → Go To 5 **Stop All Actuations**	All
4	If there are no possible causes remaining, replace the fuel injector. View repair options. Repair Replace the fuel injector. Perform the Powertrain Verification Test - Ver 5	All
5	Turn ignition off. Disconnect the fuel injector no. 5 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the fuel injector no. 5 driver circuit from the fuel injector no. 5 electrical connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open fuel injector no. 5 driver circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the fuel injector no. 5 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the fuel injector no. 5 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the injector driver circuit for a short to ground. Note: A shorted injector driver circuit may have ruined the injector also. Injector resistance should be between 10 and 16 ohms. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0205-INJECTOR #5 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the injector wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P0206-INJECTOR #6 CONTROL CIRCUIT

When Monitored and Set Condition:

P0206-INJECTOR #6 CONTROL CIRCUIT

When Monitored: With battery voltage greater than 10.4 volts, the auto shutdown relay energized, injector pulse width less than 10ms, and engine speed less than 3000 rpm.

Set Condition: This trouble code takes .64 to 10.0 seconds to set when no inductive kick is sensed .18ms after injector turn off, and with no other injectors on.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
FUEL INJECTOR
WIRING HARNESS INTERMITTENT
FUEL INJECTOR NO. 6 DRIVER CIRCUIT OPEN
FUEL INJECTOR NO. 6 DRIVER CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (INJECTOR DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0206? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the fuel injector no. 6 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 6. Using a 12-volt test light connected to ground, check the ASD relay output circuit at the injector connector. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the open/high resistance in the ASD relay output circuit. Note: Check fuse in the PDC. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All

P0206-INJECTOR #6 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the fuel injector no. 6 electrical connector. **Note: The next test step requires the use of an analog voltmeter.** **Note: Pay careful attention to the voltmeter needle in order to have valid test results.** Connect the positive lead of the voltmeter to a known good 12 volt source (B+). Connect the negative lead of the voltmeter to the fuel injector no. 6 driver circuit at the fuel injector no. 6 electrical connector. Turn ignition on. With the DRB, actuate fuel injector no. 6 and observe the voltmeter needle. Does the needle fluctuate? Yes → Go To 4 No → Go To 5 **Stop All Actuations**	All
4	If there are no possible causes remaining, replace the fuel injector. View repair options. Repair Replace the fuel injector. Perform the Powertrain Verification Test - Ver 5	All
5	Turn ignition off. Disconnect the fuel injector no. 6 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the fuel injector no. 6 driver circuit from the fuel injector no. 6 electrical connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open fuel injector no. 6 driver circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the fuel injector no. 6 electrical connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the fuel injector no. 6 driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the injector driver circuit for a short to ground. Note: A shorted injector driver circuit may have ruined the injector also. Injector resistance should be between 10 and 16 ohms. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0206-INJECTOR #6 CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the injector wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom List:

P0300-MULTIPLE CYLINDER MIS-FIRE
P0301-CYLINDER #1 MISFIRE
P0302-CYLINDER #2 MISFIRE
P0303-CYLINDER #3 MISFIRE
P0304-CYLINDER #4 MISFIRE
P0305-CYLINDER #5 MISFIRE
P0306-CYLINDER #6 MISFIRE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0300-MULTIPLE CYLINDER MIS-FIRE.

When Monitored and Set Condition:

P0300-MULTIPLE CYLINDER MIS-FIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0301-CYLINDER #1 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0302-CYLINDER #2 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0303-CYLINDER #3 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0304-CYLINDER #4 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

P0305-CYLINDER #5 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

P0306-CYLINDER #6 MISFIRE

When Monitored: Any time the engine is running, and the adaptive numerator has been successfully updated.

Set Condition: When more than a 2% misfire rate is measured during two trips, or with a 10% to 30% misfire rate during one trip.

POSSIBLE CAUSES
ENGINE MECHANICAL PROBLEM
ERRATIC CAM/CRANK SENSOR SIGNALS
MIS-FIRE CONDITIONS NO LONGER EXIST
OTHER POSSIBLE CAUSES FOR MIS-FIRE
SECONDARY IGNITION OR MECHANICAL PROBLEM

TEST	ACTION	APPLICABILITY
1	With the DRB, read the DTC's. Is the MIS-FIRE GOOD TRIP counter displayed and equal to zero? Yes → Go To 2 No → Go To 3	All
2	At this time the conditions that set the Misfire DTC are present. With the DRB, read and record the FREEZE FRAME DATA and SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition(s) that has set this DTC. When the vehicle is operating in the SIMILAR CONDITIONS WINDOW, refer to the WHICH CYLINDER IS MISFIRING screen. Is the DRB counting mis-fires at this time? Yes → Go To 4 No → Go To 3	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
3	At this time the mis-fire does not exist or is an intermittent problem. **Note: An intermittent problem may have been caused by moisture in the secondary ignition.** With the DRB, read and record the FREEZE FRAME DATA and SIMILAR CONDITIONS WINDOW DATA. With these screens, attempt to duplicate the condition that has set the Misfire DTC. While using FREEZE FRAME DATA, pay particular attention to the DTC setting conditions, such as speed, temp, load, and map vacuum. Does the mis-fire reoccur? Yes → Go To 4 No → Mis-fire DTC conditions no longer exist. Refer to any TSB's that may relate to the symptom. Operate the vehicle for 1 misfire good trip and erase DTC's. Perform the FUEL/MISFIRE VERIFICATION TEST.	All
4	With the DRB, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME, are the adaptive fuel percentages greater than +/- 15%? Yes → Refer to symptom *CHECKING FUEL DELIVERY in the DRIVEABILITY category. No → Go To 5	All
5	With the DRB, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the engine RPM over 3000 and the operating temp normal? Yes → Test CMP and CKP signals with Lab Scope, check valve timing, and perform running vacuum test. Perform the FUEL/MISFIRE VERIFICATION TEST. No → Go To 6	All
6	Check for any of the following conditions/mechanical problems. ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. ENGINE PCV SYSTEM - must flow freely TORQUE CONVERTER STALL SPEED - must be within specifications POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform the FUEL/MISFIRE VERIFICATION TEST. No → Go To 7	All

P0300-MULTIPLE CYLINDER MIS-FIRE — Continued

TEST	ACTION	APPLICABILITY
7	With the DRB, read the FREEZE FRAME DATA. Use the FREEZE FRAME DATA and attempt to determine the cause of the Misfire DTC. In the FREEZE FRAME DATA, is the LOAD VALUE over 50% and the operating temp normal? Yes → Check secondary ignition, compression, and cylinder leakage. Perform the FUEL/MISFIRE VERIFICATION TEST. No → Go To 8	All
8	**Note: Anything that affects the speed of the crankshaft can cause a misfire DTC.** The following are other possible causes for mis-fire: Injector harness connectors, secondary ignition problem, mechanical engine problem, PCM power grounds, irregular cam and crank signal, plugged injectors, restricted exhaust, intake restriction, damaged trigger wheel, contaminated fuel, or vacuum leak. Weak valve springs, carbon deposits on valves, or accessory drive belt (serpentine belt). Check for any TSB's that may relate to a Misfire DTC. Do any of the above causes exist? Yes → Repair as necessary. Perform the FUEL/MISFIRE VERIFICATION TEST. No → Test Complete.	All

Symptom:

P0320-NO CRANK REFERENCE SIGNAL AT PCM

When Monitored and Set Condition:

P0320-NO CRANK REFERENCE SIGNAL AT PCM

When Monitored: During engine cranking.

Set Condition: No signal from the crankshaft position sensor is present during engine cranking, and at least 3 camshaft position sensor signals have occurred.

POSSIBLE CAUSES
8 VOLT SUPPLY CIRCUIT OPEN
8 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
8 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
8 VOLT SUPPLY SHORTED TO SENSOR GROUND CIRCUIT
CKP SIGNAL CIRCUIT SHORTED TO 8 VOLT SUPPLY CIRCUIT
CKP SIGNAL CIRCUIT SHORTED TO VOLTAGE
TONE WHEEL/FLEX PLATE DAMAGED
SENSOR GROUND CIRCUIT OPEN
IRREGULAR LAB SCOPE PATTERN OF CKP SIGNAL
STRAY SIGNAL FROM THE CAMSHAFT POSITION SENSOR
WIRING HARNESS INTERMITTENT
CKP SIGNAL CIRCUIT OPEN
CKP SIGNAL CIRCUIT SHORTED TO GROUND
CKP SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
CRANKSHAFT POSITION SENSOR
POWERTRAIN CONTROL MODULE (8 VOLT SUPPLY)
POWERTRAIN CONTROL MODULE (CKP SIGNAL CIRCUIT)
POWERTRAIN CONTROL MODULE (SENSOR GROUND CIRCUIT)

TEST	ACTION	APPLICABILITY
1	With the DRB in Inputs/Outputs, read the Current CKP State while cranking the engine. Does the DRB display Current CKP State ″Present″ while cranking the engine? No → Go To 2 Yes → Go To 23	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Turn ignition on. Using a voltmeter, measure the 8 volt supply circuit at the CKP Sensor connector. Select a conclusion that best matches your voltage measurement. Less than 7.5 volts Go To 3 Between 7.5 and 8.5 volts Go To 10 Greater than 8.5 volts Repair the 8 volt supply circuit for a short to voltage. Perform the Powertrain Verification Test - Ver 5	All
3	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance of the 8 volt supply circuit from the CKP sensor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open 8 volt supply circuit. Perform the Powertrain Verification Test - Ver 5	All
4	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between the 8 Volt Supply circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the 8 volt supply circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 5	All
5	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between the 8 volt supply circuit and the sensor ground circuit at the CKP Sensor connector. Is the resistance below 5.0 ohms? Yes → Repair the 8 volt supply circuit shorted to the sensor ground circuit. Perform the Powertrain Verification Test - Ver 5 No → Go To 6	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
6	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Turn ignition on. Using a voltmeter, measure the CKP signal circuit at the CKP Sensor connector. Select a conclusion that best matches your voltage measurement. Less than 4.5 volts Go To 11 Between 4.5 and 5.5 volts Go To 7 Between 7.5 and 8.5 volts Repair the CKP signal circuit for a short to the 8 volt supply circuit. Perform the Powertrain Verification Test - Ver 5 Greater than 8.5 volts Repair the CKP signal circuit shorted to voltage. Perform the Powertrain Verification Test - Ver 5	All
7	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Using an ohmmeter, measure the resistance between the Sensor Ground circuit in the CKP Sensor connector and Ground. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Go To 20	All
8	Turn ignition off. Disconnect and remove the crankshaft position sensor. Inspect the tone wheel/flex plate for physical damage. Make sure that it turns when the engine is cranked. Is the tone wheel/pulse ring free from defects? Yes → Go To 9 No → Repair/replace tone wheel/flex plate as necessary.	All
9	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
10	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Turn ignition on. Using a voltmeter, measure the CKP signal circuit at the CKP Sensor connector. Select a conclusion that best matches your voltage measurement. Less than 4.5 volts Go To 11 Between 4.5 and 5.5 volts Go To 17 Between 7.5 and 8.5 volts Repair the CKP signal circuit for a short to the 8 volt supply circuit. Perform the Powertrain Verification Test - Ver 5 Greater than 8.5 volts Repair the CKP signal circuit shorted to voltage. Perform the Powertrain Verification Test - Ver 5	All
11	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the CKP signal circuit from the CKP sensor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the open CKP signal circuit. Perform the Powertrain Verification Test - Ver 5	All
12	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the CKP Sensor signal circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the CKP signal circuit for a short to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 13	All
13	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the CKP Sensor Signal circuit and the Sensor Ground circuit at the CKP Sensor connector. Is the resistance below 5.0 ohms? Yes → Repair the CKP signal circuit for a short to the sensor ground circuit. Perform the Powertrain Verification Test - Ver 5 No → Go To 14	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
14	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Using an ohmmeter, measure the resistance between the Sensor Ground circuit in the CKP Sensor connector and Ground. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Go To 20	All
15	Turn ignition off. Disconnect and remove the crankshaft position sensor. Inspect the tone wheel/flex plate for physical damage. Make sure that it turns when the engine is cranked. Is the tone wheel/pulse ring free from defects? Yes → Go To 16 No → Repair/replace tone wheel/flex plate as necessary.	All
16	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All
17	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Using an ohmmeter, measure the resistance between the Sensor Ground circuit in the CKP Sensor connector and Ground. Is the resistance below 5.0 ohms? Yes → Go To 18 No → Go To 20	All
18	Turn ignition off. Disconnect and remove the crankshaft position sensor. Inspect the tone wheel/flex plate for physical damage. Make sure that it turns when the engine is cranked. Is the tone wheel/pulse ring free from defects? Yes → Go To 19 No → Repair/replace tone wheel/flex plate as necessary.	All
19	Turn ignition off. If there are no possible causes remaining, replace the Crankshaft Position Sensor. View repair options. Repair Replace the Crankshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
20	Turn ignition off. Disconnect and remove the crankshaft position sensor. Inspect the tone wheel/flex plate for physical damage. Make sure that it turns when the engine is cranked. Is the tone wheel/pulse ring free from defects? Yes → Go To 21 No → Repair/replace tone wheel/flex plate as necessary.	All
21	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the sensor ground circuit from the CKP sensor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 22 No → Repair the open sensor ground circuit. Perform the Powertrain Verification Test - Ver 5	All
22	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All
23	Turn ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 24	All
24	Turn ignition off. Connect the DRBIII lab scope to the CKP signal circuit. For best results, backprobe at the PCM using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5 No → Go To 25	All

P0320-NO CRANK REFERENCE SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
25	Turn ignition off. Connect the DRBIII lab scope to the CMP signal circuit. For best results, backprobe at the PCM using Miller special tool #6801. While observing the lab scope screen, turn ignition on (do not start engine). Look for any pulses generated by the cam sensor. Did the Camshaft Position Sensor generate any pulses? Yes → Replace the Camshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:

P0325-KNOCK SENSOR #1 CIRCUIT

When Monitored and Set Condition:

P0325-KNOCK SENSOR #1 CIRCUIT

When Monitored: With the ignition on and the engine running.

Set Condition: The knock sensor circuit voltage falls below a minimum value at idle or deceleration. The minimum value is from a look-up table internal to the PCM and is based on engine rpm. DTC also sets if sensor output goes above 5.0 volts.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
KNOCK SENSOR RETURN OPEN
KNOCK SENSOR SIGNAL OPEN
KNOCK SENSOR SIGNAL SHORTED TO GROUND
KNOCK SENSOR SIGNAL SHORTED TO SENSOR GROUND
KNOCK SENSOR SIGNAL SHORTED TO VOLTAGE
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRBIII®, read DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between ground and the Knock Sensor Signal circuit. Is the resistance below 5.0 ohms? Yes → Repair the Knock Sensor Signal circuit for a short to ground. Perform the Powertrain Verification Test - Ver 2. No → Go To 3	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the Sensor Ground and the Knock Sensor Signal circuit at the Knock Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Repair the Knock Sensor Signal circuit for a short to sensor ground. Perform the Powertrain Verification Test - Ver 2. No → Go To 4	All
4	Turn the ignition off. Disconnect the Knock Sensor harness connector. Measure the resistance between the Knock Sensor Return/Ground circuit and ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open Knock Sensor Return/Ground circuit. Perform the Powertrain Verification Test - Ver 2.	All
5	Turn the ignition off. Disconnect the Knock Sensor harness connector. Turn the ignition on. Measure the voltage between Knock Sensor Signal circuit and ground. Is the voltage above 2.0 volts? Yes → Repair the Knock Sensor Signal circuit for a short to voltage. Perform the Powertrain Verification Test - Ver 2. No → Go To 6	All
6	Turn the ignition off. Disconnect the Knock Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the Knock Sensor Signal circuit between the Knock Sensor connector and the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the Knock Sensor Signal circuit for an open. Perform the Powertrain Verification Test - Ver 2.	All
7	Turn the ignition off. Replace the Knock Sensor. Turn the ignition on. With the DRBIII®, erase DTC's. Test drive the vehicle. Did the Knock Sensor Circuit trouble code return? Yes → Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 2. No → Test Complete.	All

P0325-KNOCK SENSOR #1 CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 2. No → Test Complete.	All

Symptom:

P0340-NO CAM SIGNAL AT PCM

When Monitored and Set Condition:

P0340-NO CAM SIGNAL AT PCM

When Monitored: Engine cranking/running.

Set Condition: At least 5 seconds have elapsed with crankshaft position sensor signals present but no camshaft position sensor signal.

POSSIBLE CAUSES
8 VOLT SUPPLY CIRCUIT SHORTED TO VOLTAGE
CMP SIGNAL CIRCUIT SHORTED TO 8 VOLT SUPPLY CIRCUIT
CMP SIGNAL CIRCUIT SHORTED TO VOLTAGE
TONE WHEEL/PULSE RING DAMAGED
SENSOR GROUND CIRCUIT OPEN
WIRING HARNESS INTERMITTENT
STRAY SIGNAL FROM THE CRANKSHAFT POSITION SENSOR
IRREGULAR LAB SCOPE PATTERN OF CMP SIGNAL
CMP SIGNAL CIRCUIT OPEN
CMP SIGNAL CIRCUIT SHORTED TO GROUND
CMP SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
8 VOLT SUPPLY CIRCUIT OPEN
8 VOLT SUPPLY CIRCUIT SHORTED TO GROUND
8 VOLT SUPPLY CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
CAMSHAFT POSITION SENSOR
POWERTRAIN CONTROL MODULE (8 VOLT SUPPLY)
POWERTRAIN CONTROL MODULE (CMP SIGNAL CIRCUIT)
POWERTRAIN CONTROL MODULE (SENSOR GROUND CIRCUIT)

TEST	ACTION	APPLICABILITY
1	With the DRB in Inputs/Outputs, read the Current CMP State while cranking the engine. Does the DRB display Current CMP State ″Present″ while cranking the engine? No → Go To 2 Yes → Go To 20	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Turn ignition on. Using a voltmeter, measure the 8 volt supply circuit at the Camshaft Position Sensor connector. Select a conclusion that best matches your voltage measurement. Less than 7.5 volts Go To 3 Between 7.5 and 8.5 volts Go To 10 Greater than 8.5 volts Repair the 8 volt supply circuit for a short to voltage. Perform the Powertrain Verification Test - Ver 5	All
3	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance of the 8 volt supply circuit from the CMP sensor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open 8 volt supply circuit. Perform the Powertrain Verification Test - Ver 5	All
4	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between the 8 Volt Supply circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the 8 volt supply circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 5	All
5	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between the 8 volt supply circuit and the sensor ground circuit at the CMP Sensor connector. Is the resistance below 5.0 ohms? Yes → Repair the 8 volt supply circuit shorted to the sensor ground circuit. Perform the Powertrain Verification Test - Ver 5 No → Go To 6	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
6	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Turn ignition on. Using a voltmeter, measure the Camshaft Position Sensor Signal circuit at the Camshaft Position Sensor connector. Select a conclusion that best matches your voltage measurement. Less than 4.5 volts Go To 11 Between 4.5 and 5.5 volts Go To 7 Between 7.5 and 8.5 volts Repair the CMP signal circuit for a short to the 8 volt supply circuit. Perform the Powertrain Verification Test - Ver 5 Greater than 8.5 volts Repair the CMP signal circuit shorted to voltage. Perform the Powertrain Verification Test - Ver 5	All
7	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Using an ohmmeter, measure the resistance between the Sensor Ground circuit in the Camshaft Position Sensor connector and ground. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Go To 18	All
8	Turn ignition off. Disconnect and remove the camshaft position sensor. Inspect the tone wheel/pulse ring for physical damage. Make sure that it turns when the engine is cranked. Is the tone wheel/pulse ring free from defects? Yes → Go To 9 No → Repair/replace tone wheel/pulse ring as necessary.	All
9	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
10	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Turn ignition on. Using a voltmeter, measure the Camshaft Position Sensor Signal circuit at the Camshaft Position Sensor connector. Select a conclusion that best matches your voltage measurement. Less than 4.5 volts Go To 11 Between 4.5 and 5.5 volts Go To 15 Between 7.5 and 8.5 volts Repair the CMP signal circuit for a short to the 8 volt supply circuit. Perform the Powertrain Verification Test - Ver 5 Greater than 8.5 volts Repair the CMP signal circuit shorted to voltage. Perform the Powertrain Verification Test - Ver 5	All
11	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance of the Camshaft Position Sensor Signal circuit from the Camshaft Position Sensor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 12 No → Repair the open Camshaft Position Sensor Signal circuit. Perform the Powertrain Verification Test - Ver 5	All
12	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between the Camshaft Position Sensor signal circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the Camshaft Position Sensor Signal circuit for a short to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 13	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
13	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between the Camshaft Position Sensor signal circuit and the sensor ground circuit at the Camshaft Position Sensor connector. Is the resistance below 5.0 ohms? Yes → Repair the Camshaft Position Sensor signal circuit for a short to the sensor ground circuit. Perform the Powertrain Verification Test - Ver 5 No → Go To 14	All
14	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All
15	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Using an ohmmeter, measure the resistance between the Sensor Ground circuit in the Camshaft Position Sensor connector and ground. Is the resistance below 5.0 ohms? Yes → Go To 16 No → Go To 18	All
16	Turn ignition off. Disconnect and remove the camshaft position sensor. Inspect the tone wheel/pulse ring for physical damage. Make sure that it turns when the engine is cranked. Is the tone wheel/pulse ring free from defects? Yes → Go To 17 No → Repair/replace tone wheel/pulse ring as necessary.	All
17	Turn ignition off. If there are no possible causes remaining, replace the Camshaft Position Sensor. View repair options. Repair Replace the Camshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5	All
18	Turn ignition off. Disconnect the Camshaft Position Sensor connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the sensor ground circuit from the Camshaft Position Sensor connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 19 No → Repair the open sensor ground circuit. Perform the Powertrain Verification Test - Ver 5	All

P0340-NO CAM SIGNAL AT PCM — Continued

TEST	ACTION	APPLICABILITY
19	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All
20	Turn ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 21	All
21	Turn ignition off. Connect the DRBIII lab scope to the CKP signal circuit. For best results, backprobe at the PCM using Miller special tool #6801. While observing the lab scope screen, turn ignition on (do not start engine). Look for any pulses generated by the crank sensor. Did the Crankshaft Position Sensor generate any pulses? Yes → Replace the Crankshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5 No → Go To 22	All
22	Turn ignition off. Connect the DRBIII lab scope to the CMP signal circuit. For best results, backprobe at the PCM using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Camshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P0351-IGNITION COIL #1 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0351-IGNITION COIL #1 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
COIL DRIVER NO. 1 CIRCUIT OPEN
COIL DRIVER NO. 1 CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT
COIL ON PLUG NO. 1
POWERTRAIN CONTROL MODULE (COIL DRIVER NO. 1)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0351? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the coil on plug no. 1 connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Using an ohmmeter, measure the primary resistance of the coil on plug. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil on plug no. 1. Perform the Powertrain Verification Test - Ver 5	All

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the coil on plug no. 1 connector. Turn ignition on. With the DRB, actuate the generator field. Using a 12-volt test light connected to ground (B-), check the ASD relay output circuit at the coil on plug no. 1 electrical connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All
4	Turn ignition off. **Note: The following test is done at the coil on plug no. 1 connector with the coil on plug connected.** Back probe the coil driver no. 1 circuit with Miller tool #6801 and a test light connected to B+. **Warning: Keep clear of the engine's moving parts.** Start the engine and observe the test light. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5 **Caution: Turn the Engine Off.**	All
5	Turn ignition off. Disconnect the coil on plug no. 1 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the coil driver no. 1 circuit from the coil on plug no. 1 connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open coil driver no. 1 circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the coil on plug no. 1 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the coil driver no. 1 circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the coil driver no. 1 circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0351-IGNITION COIL #1 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil on plug wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
P0352-IGNITION COIL #2 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0352-IGNITION COIL #2 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
COIL DRIVER NO. 2 CIRCUIT OPEN
COIL DRIVER NO. 2 CIRCUIT SHORTED TO GROUND
WIRING HARNESS INTERMITTENT
COIL ON PLUG NO. 2
POWERTRAIN CONTROL MODULE (COIL DRIVER NO. 2)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0352? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the coil on plug no. 2 connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Using an ohmmeter, measure the primary resistance of the coil on plug. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil on plug no. 2. Perform the Powertrain Verification Test - Ver 5	All

P0352-IGNITION COIL #2 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the coil on plug no. 2 connector. Turn ignition on. With the DRB, actuate the generator field. Using a 12-volt test light connected to ground (B-), check the ASD relay output circuit at the coil on plug no. 2 electrical connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All
4	Turn ignition off. **Note: The following test is done at the coil on plug no. 2 connector with the coil on plug connected.** Back probe the coil driver no. 2 circuit with Miller tool #6801 and a test light connected to B+. **Warning: Keep clear of the engine's moving parts.** Start the engine and observe the test light. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5 **Caution: Turn the Engine Off.**	All
5	Turn ignition off. Disconnect the coil on plug no. 2 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the coil driver no. 2 circuit from the coil on plug no. 2 connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open coil driver no. 2 circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the coil on plug no. 2 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the coil driver no. 2 circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the coil driver no. 2 circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0352-IGNITION COIL #2 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil on plug wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P0353-IGNITION COIL #3 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0353-IGNITION COIL #3 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
COIL ON PLUG NO. 3
WIRING HARNESS INTERMITTENT
COIL DRIVER NO. 3 CIRCUIT OPEN
COIL DRIVER NO. 3 CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (COIL DRIVER NO. 3)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0353? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the coil on plug no. 3 connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Using an ohmmeter, measure the primary resistance of the coil on plug. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil on plug no. 3. Perform the Powertrain Verification Test - Ver 5	All

P0353-IGNITION COIL #3 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the coil on plug no. 3 connector. Turn ignition on. With the DRB, actuate the generator field. Using a 12-volt test light connected to ground (B-), check the ASD relay output circuit at the coil on plug no. 3 electrical connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All
4	Turn ignition off. **Note: The following test is done at the coil on plug no. 2 connector with the coil on plug connected.** Back probe the coil driver no. 3 circuit with Miller tool #6801 and a test light connected to B+. **Warning: Keep clear of the engine's moving parts.** Start the engine and observe the test light. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5 **Caution: Turn the Engine Off.**	All
5	Turn ignition off. Disconnect the coil on plug no. 3 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the coil driver no. 3 circuit from the coil on plug no. 3 connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open coil driver no. 3 circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the coil on plug no. 3 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the coil driver no. 3 circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the coil driver no. 3 circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0353-IGNITION COIL #3 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil on plug wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P0354-IGNITION COIL #4 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0354-IGNITION COIL #4 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
COIL DRIVER NO. 4 CIRCUIT OPEN
WIRING HARNESS INTERMITTENT
COIL DRIVER NO. 4 CIRCUIT SHORTED TO GROUND
COIL ON PLUG #4 DEFECTIVE
POWERTRAIN CONTROL MODULE (COIL DRIVER NO. 4)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0354? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the coil on plug no. 4 connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Using an ohmmeter, measure the primary resistance of the coil on plug. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil on plug no. 4. Perform the Powertrain Verification Test - Ver 5	All

P0354-IGNITION COIL #4 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the coil on plug #4 connector. Turn ignition on. With the DRB, actuate the generator field. Using a 12-volt test light connected to ground (B-), check the ASD relay output circuit at the coil on plug electrical connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All
4	Turn ignition off. **Note: The following test is done at the coil on plug no. 2 connector with the coil on plug connected.** Back probe the coil driver no. 4 circuit with Miller tool #6801 and a test light connected to B+. **Warning: Keep clear of the engine's moving parts.** Start the engine and observe the test light. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5 **Caution: Turn the Engine Off.**	All
5	Turn ignition off. Disconnect the coil on plug no. 4 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the coil driver no. 4 circuit from the coil on plug no. 4 connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open coil driver no. 4 circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the coil on plug no. 4 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the coil driver no. 4 circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the coil driver no. 4 circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0354-IGNITION COIL #4 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil on plug wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P0355-IGNITION COIL #5 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0355-IGNITION COIL #5 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
COIL DRIVER NO. 5 CIRCUIT OPEN
WIRING HARNESS INTERMITTENT
COIL DRIVER NO. 5 CIRCUIT SHORTED TO GROUND
COIL ON PLUG NO. 5
POWERTRAIN CONTROL MODULE (COIL DRIVER NO. 5)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0355? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the coil on plug no. 5 connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Using an ohmmeter, measure the primary resistance of the coil on plug. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil on plug no. 5. Perform the Powertrain Verification Test - Ver 5	All

P0355-IGNITION COIL #5 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the coil on plug no. 5 connector. Turn ignition on. With the DRB, actuate the generator field. Using a 12-volt test light connected to ground (B-), check the ASD relay output circuit at the coil on plug no. 5 electrical connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All
4	Turn ignition off. **Note: The following test is done at the coil on plug no. 2 connector with the coil on plug connected.** Back probe the coil driver no. 5 circuit with Miller tool #6801 and a test light connected to B+. **Warning: Keep clear of the engine's moving parts.** Start the engine and observe the test light. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5 **Caution: Turn the Engine Off.**	All
5	Turn ignition off. Disconnect the coil on plug no. 5 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the coil driver no. 5 circuit from the coil on plug no. 5 connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open coil driver no. 5 circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the coil on plug no. 5 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the coil driver no. 5 circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the coil driver no. 5 circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0355-IGNITION COIL #5 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil on plug wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P0356-IGNITION COIL #6 PRIMARY CIRCUIT

When Monitored and Set Condition:

P0356-IGNITION COIL #6 PRIMARY CIRCUIT

When Monitored: With battery voltage greater than 8 volts during engine cranking or greater than 12 volts with engine running, engine rpm less than 2016, and none of the coils in dwell when checked.

Set Condition: Peak current is not achieved with battery based dwell plus 1.5 msec of diagnostic offset. It takes less than 3 seconds during cranking or up to 6 seconds while running to set.

POSSIBLE CAUSES
OPEN/HIGH RESISTANCE IN THE ASD RELAY OUTPUT CIRCUIT
COIL DRIVER NO. 6 CIRCUIT OPEN
WIRING HARNESS INTERMITTENT
COIL DRIVER NO. 6 CIRCUIT SHORTED TO GROUND
COIL ON PLUG NO. 6
POWERTRAIN CONTROL MODULE (COIL DRIVER NO. 6)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0356? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the coil on plug no. 6 connector. **Note: The following resistance measurement should be taken at 70-80 degrees F.** Using an ohmmeter, measure the primary resistance of the coil on plug. Is the resistance between 0.6 and 0.9 ohms? Yes → Go To 3 No → Replace the coil on plug no. 6. Perform the Powertrain Verification Test - Ver 5	All

P0356-IGNITION COIL #6 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the coil on plug no. 6 connector. Turn ignition on. With the DRB, actuate the generator field. Using a 12-volt test light connected to ground (B-), check the ASD relay output circuit at the coil on plug no. 6 electrical connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open/high resistance in the ASD relay output circuit. Perform the Powertrain Verification Test - Ver 5 **Stop All Actuations**	All
4	Turn ignition off. **Note: The following test is done at the coil on plug no. 2 connector with the coil on plug connected.** Back probe the coil driver no. 6 circuit with Miller tool #6801 and a test light connected to B+. **Warning: Keep clear of the engine's moving parts.** Start the engine and observe the test light. Does the test light blink/flicker? Yes → Test Complete. No → Go To 5 **Caution: Turn the Engine Off.**	All
5	Turn ignition off. Disconnect the coil on plug no. 6 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance of the coil driver no. 6 circuit from the coil on plug no. 6 connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open coil driver no. 6 circuit. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect the coil on plug no. 6 connector. Disconnect the Powertrain Control Module connectors. Using an ohmmeter, measure the resistance between the coil driver no. 6 circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the coil driver no. 6 circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All

P0356-IGNITION COIL #6 PRIMARY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	**Note: The conditions required to set the DTC are not present.** **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the coil on plug wiring while the engine is running. Listen for the engine to miss or stall. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:

P0401 - EGR SYSTEM FAILURE

When Monitored and Set Condition:

P0401 - EGR SYSTEM FAILURE

When Monitored: With engine temp greater than 82 degress C (180 degress F) ambient temp above -18 degress C (0 degress F), engine in closed loop, O2 sensor operational, engine under a steady load with the throttle open, and 02 controller not at or near its limits.

Set Condition: Conditions are met, the EGR is turned off and on momentarily. The oxygen sensor signal is monitor for changes in its output signal during this test. If no significant change or too much change is seen, a flag is set.

POSSIBLE CAUSES
INSPECT EGR ASSEMBLY
EGR VALVE OPEN AT IDLE
WIRING HARNESS INTERMITTENT
ASD RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CKT OPEN
EGR SOLENOID CONTROL CKT SHORT TO GND
EGR SOLENOID CONTROL CKT SHORTED TO SENSOR GND
EGR SOLENOID CONTROL CKT SHORTED TO VOLTAGE
PCM
PCM OPEN INTERNALLY
PCM SHORTED INTERNALLY

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read DTC's. Is the Globel Good Trip displayed and equal to 0. Yes → Go To 2 No → Go To 14	All

P0401 - EGR SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
2	**Note: If the vehicle is running rough at idle (DRB not actuated) follow the yes path to continue.** Turn the ignition on. Turn all accessories off. Start the engine. Allow the engine to reach normal operating temperature. With the DRB, enter Engine System Test, then EGR System Test. Actuate the FLOW function in the EGR System Test. Did the engine run rough or stall? Yes → Go To 3 No → Go To 7	All
3	Turn the ignition off. Disconnect the EGR Solenoid Assembly harness connector. Start engine. Attempt to allow the engine to idle. Does the engine run rough or stall? Yes → Inspect the EGR tube assembly. If OK, replace the EGR valve. Perform the Powertrain Verification Test - Ver 2 No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit to engine ground at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the EGR solenoid control circuirt. Perform the Powertrain Verification Test - Ver 2 No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit to sensor ground circuit at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the EGR solenoid control circuit for a short to the sensor ground circuit. Perform the Powertrain Verification Test - Ver 2 No → Go To 6	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 2	All

P0401 - EGR SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
7	Turn the ignition on. Turn all accessories off. Disconnect the EGR solenoid harness connector. Using a 12-volt Test Light connected to the ASD relay out ckt, probe the EGR solenoid control circuit. With the DRB, actuate the EGR solenoid. Does the 12 volt test light flash on and off? Yes → Go To 8 No → Go To 10	All
8	Turn the ignition off. Remove the EGR valve assembly and tube. Inspect the EGR valve assembly and the EGR tube for damage, obstructions and leaks. Were any problems found. Yes → Repair or replace EGR solenoid assembly as necessary. Perform the Powertrain Verification Test - Ver 2 No → Go To 9	All
9	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 2	All
10	Turn the igntion off. Disconnect the EGR solenoid harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12-volt Test Light connected to ground, probe the ASD relay output circuit at the EGR solenoid harness connector. Does the 12 volt test light illuminate? Yes → Go To 11 No → Repair the open in the ASD Realy output circuit. Perform the Powertrain Verification Test - Ver 2	All
11	Turn the ignition off. Disconnect the EGR solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR solenoid control circuit in the EGR solenoid connector. Is the voltage above 4.9 volts. Yes → Repair the short to voltage in the EGR solenoid control circuit. Perform the Powertrain Verification Test - Ver 2 No → Go To 12	All

P0401 - EGR SYSTEM FAILURE — Continued

TEST	ACTION	APPLICABILITY
12	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit between the PCM connector and the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Go To 13 No → Repair the open in the EGR solenoid control circuit. Perform the Powertrain Verification Test - Ver 2	All
13	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 2	All
14	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

Symptom:

P0403 - EGR SOLENOID CIRCUIT

When Monitored and Set Condition:

P0403 - EGR SOLENOID CIRCUIT

When Monitored: With the ignition on, and the engine running and the battery voltage greater than 10.4 volts.

Set Condition: The EGR solenoid control circuit is not in the expected state when requested to operate by the PCM.

POSSIBLE CAUSES
EGR SOLENOID ASSEMBLY
WIRING HARNESS INTERMITTENT
ASD RELAY OUTPUT CIRCUIT OPEN
EGR SOLENOID CONTROL CKT OPEN
EGR SOLENOID CONTROL CKT SHORT TO GND
EGR SOLENOID CONTROL CKT SHORTED TO SENSOR GND
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read the DTC's. Is the Global Good Trip counter equal to 0. Yes → Go To 2 No → Go To 8	All
2	Turn the ignition on. Turn all accessories off. Disconnect the EGR solenoid harness connector. Using a 12-volt Test Light connected to the ASD relay out ckt, probe the EGR solenoid control circuit at EGR solenoid harness connector. With the DRB, actuate the EGR solenoid. Does the 12 volt test light flash on and off? Yes → Replace the EGR solenoid assembly. Perform the Powertrain Verification Test - Ver 2 No → Go To 3	All

P0403 - EGR SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn the igntion off. Disconnect the EGR solenoid harness connector. Turn the ignition on. With the DRB, actuate the ASD Relay. Using a 12-volt Test Light connected to ground, probe the ASD relay output circuit at the EGR solenoid harness connector. Does the 12 volt test light illuminate? Yes → Go To 4 No → Repair the open in the ASD Realy output circuit. Perform the Powertrain Verification Test - Ver 2	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit to engine ground at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the EGR solenoid control circuirt. Perform the Powertrain Verification Test - Ver 2 No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit between the PCM connector and the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the EGR solenoid control circuit. Perform the Powertrain Verification Test - Ver 2	All
6	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR solenoid control circuit to sensor ground circuit at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the EGR solenoid control circuit for a short to the sensor ground circuit. Perform the Powertrain Verification Test - Ver 2 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 2	All

P0403 - EGR SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

Symptom:

P0404 - EGR POSITION SENSOR RATIONALITY

When Monitored and Set Condition:

P0404 - EGR POSITION SENSOR RATIONALITY

When Monitored:

Set Condition: The EGR flow or valve movement is not what is expected.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
HIGH RESISTANCE SENSOR GND CKT
HIGH RESISTANCE EGR SENSOR SIGNAL CKT
EGR SENSOR
PCM

TEST	ACTION	APPLICABILITY
1	**Note: If any other EGR trouble code are set, diagnose them first before proceeding with P0404.** Turn the ignition on. With the DRB, read DTC's. Is the Global Good Trip displayed and equal to 0? Yes → Go To 2 No → Go To 6	All
2	Turn the ignition off. Disconnect the EGR solenoid harness connector. Turn the ignition on. With the DRB, monitor the EGR sense voltage while connecting a jumper wire between the EGR sensor signal and ground. Does the voltage go from 5.0 volts to below 1.0 volts? Yes → Replace the EGR solenoid assembly. Perform the Powertrain Verification Test - Ver 2 No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Using a jumper wire connected to engine ground, probe the sensor ground circuit at the PCM connector. Using a 12 volt test light connected to battery voltage, probe the sensor ground ckt at the EGR solenoid harness connector. Does the test light illuminate? Yes → Go To 4 No → Repair the open or high resistance in the sensor ground circuit. Perform the Powertrain Verification Test - Ver 2	All

P0404 - EGR POSITION SENSOR RATIONALITY — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Using a jumper wire connected to engine ground, probe the EGR sensor signal circuit at the PCM connector. Using a 12 volt test light connected to battery voltage, probe the EGR sensor signal ckt at the EGR solenoid harness connector. Does the test light illuminate bright? Yes → Go To 5 No → Repair the open or high resistance in the EGR sensor signal circuit. Perform the Powertrain Verification Test - Ver 2	All
5	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the EGR solenoid assembly. Perform the Powertrain Verification Test - Ver 2	All
6	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

Symptom:

P0405 - EGR POSITION SENSOR VOLTAGE TOO LOW

When Monitored and Set Condition:

P0405 - EGR POSITION SENSOR VOLTAGE TOO LOW

When Monitored: With the ignition on and battery voltage above 10.0 volts.

Set Condition: EGR position sensor signal is less than 0.157 volts.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
5 VOLT SUPPLY CKT OPEN
EGR SENSOR SIGNAL CKT SHORT TO GND
EGR SENSOR SIGNAL CKT SHORTED TO SENSOR GND
EGR SENSOR
EGR SENSOR POTENTIOMETER
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read DTC's. Is the Global Good Trip displayed and equal to 0? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the EGR solenoid harness connector. Turn the ignition on. With the DRB, monitor the EGR position sensor voltage. Is the voltage above 4.0 volts? Yes → Replace the EGR solenoid assembly. Perform the Powertrain Verification Test - Ver 2 No → Go To 3	All
3	Turn the ignition off. Disconnect the EGR solenoid harness connector. Turn the ignition on. Measure the voltage of the 5 volt supply circuit. Is the voltage below 4.5 volts? Yes → Repair the open in the 5 volt supply circuit. Perform the Powertrain Verification Test - Ver 2 No → Go To 4	All

P0405 - EGR POSITION SENSOR VOLTAGE TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR sensor signal circuit to engine ground at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the EGR sensor signal circuirt. Perform the Powertrain Verification Test - Ver 2 No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR sensor signal circuit to sensor ground circuit at the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Repair the EGR sensor signal circuit for a short to the sensor ground circuit. Perform the Powertrain Verification Test - Ver 2 No → Go To 6	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM Perform the Powertrain Verification Test - Ver 2	All
7	**Note: The engine will run rough and possibly stall in the following test. Feather the accelerator panel to keep the engine from stalling.** Start the engine. With the DRB, enter Engine System Test and then EGR System Test. Push the 4=VARIABLE function. Monitor the EGR voltage while slowly pushing the up arrow. Is the voltage change smooth? Yes → Go To 8 No → Replace the EGR solenoid assembly. Perform the Powertrain Verification Test - Ver 2	All
8	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

Symptom:

P0406 - EGR POSITION SENSOR VOLTS TOO HIGH

When Monitored and Set Condition:

P0406 - EGR POSITION SENSOR VOLTS TOO HIGH

When Monitored: With the ignition on and the battery voltage above 10.0 volts.

Set Condition: EGR position sensor signal is greater than 4.91 volts 6 seconds.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
SENSOR GROUND OPEN
EGR SENSOR SIGNAL CKT OPEN
EGR SENSOR SIGNAL SHORTED TO VOLTAGE
EGR SENSOR SIGNAL CKT SHORTED TO 5 VOLT SUPPLY CKT
EGR SENSOR
EGR SENSOR POTENTIOMETER
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read DTC's. Is the Global Good Trip displayed and equal to 0? Yes → Go To 2 No → Go To 8	All
2	Turn the ignition off. Disconnect the EGR solenoid harness connector. Turn the ignition on. Measure the voltage of the EGR sensor signal circuit in the EGR solenoid connector. Is the voltage above 5.0 volts. Yes → Repair the short to voltage in the EGR sensor signal circuit. Perform the Powertrain Verification Test - Ver 2 No → Go To 3	All
3	Turn the ignition off. Disconnect the EGR solenoid harness connector. Turn the ignition on. With the DRB, monitor the EGR sense voltage while connecting a jumper wire between the EGR sensor signal and sensor ground ckt. Is the voltage below 1.0 volt? Yes → Replace the EGR solenoid assembly. Perform the Powertrain Verification Test - Ver 2 No → Go To 4	All

P0406 - EGR POSITION SENSOR VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the igntion off. Disconnect the EGR solenoid harness connector. Using a 12-volt Test Light connected to 12-volts, probe the sensor ground circuit. Does the 12 volt test light illuminate? Yes → Go To 5 No → Repair the open in the sensor ground circuit. Perform the Powertrain Verification Test - Ver 2	All
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the EGR solenoid harness connector. Measure the resistance of the EGR sensor signal circuit between the PCM connector and the EGR solenoid connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open in the EGR sensor signal circuit. Perform the Powertrain Verification Test - Ver 2	All
6	Turn the ignition on. Disconnect the EGR solenoid harness connector. Disconnect the PCM harness connector. Measure the resistance from the EGR sensor signal ckt to the 5 volt supply ckt at the EGR solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Repair the EGR sensor signal ckt shorted to the 5 volt supply ckt. Perform the Powertrain Verification Test - Ver 2 No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 2	All
8	**Note: The engine will run rough and possibly stall in the following test. Feather the accelerator panel to keep the engine from stalling.** Start the engine. With the DRB, enter Engine System Test and then EGR System Test. Push the 4=VARIABLE function. Monitor the EGR voltage while slowly pushing the up arrow. Is the voltage change smooth? Yes → Go To 9 No → Replace the EGR solenoid assembly. Perform the Powertrain Verification Test - Ver 2	All

P0406 - EGR POSITION SENSOR VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
9	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

Symptom:
P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored and Set Condition:

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored: After engine warm up to 147 deg. F, 180 seconds of open throttle operation, at a speed greater than 20 mph, with the engine at 1200-1700 rpm and MAP vacuum between 15.0 and 21.0 inches of mercury (Hg).

Set Condition: As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value a counter is incremented by one.

POSSIBLE CAUSES
CATALYST EFFICIENCY DTC DOES NOT REOCCUR
ENGINE MECHANICAL PROBLEM
EXHAUST LEAK
CATALYTIC CONVERTER 1/1
UPSTREAM O2 SENSOR OLDER THAN DOWNSTREAM O2 SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRB, read the DTCs. Is the GLOBAL GOOD TRIP counter displayed and equal to zero? Yes → Go To 3 No → Go To 2	All
2	At this time the Catalyst Efficiency Failure does not exist or is an intermittent problem. With the DRB, read the FREEZE FRAME data. With this screen, attempt to duplicate the condition that has set this fault. While using FREEZE FRAME pay particular attention to the fault setting conditions, such as speed, temp, load, and map vacuum. Does the Catalyst Efficiency DTC Reoccur? Yes → Go To 3 No → The Catalytic Conveter Efficiency Failure no longer exists.	All
3	**Check the exhaust for excessive smoke from internal oil or coolant leaks.** Is there an oil or coolant consumption condition present? Yes → Repair engine mechanical condition as necessary and replace Catalytic Converter. Perform the Powertrain Verification Test - Ver 2. No → Go To 4	All

P0420-1/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
4	Start Engine and let idle. Check for exhaust leaks between the Engine and the appropriate Downstream O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform the Powertrain Verification Test - Ver 2. No → Go To 5	All
5	**NOTE: A new Downstream O2 Sensor along with an aging Upstream O2 Sensor may cause this trouble code to set.** Review vehicle repair history. Has the Downstream O2 Sensor been replaced without replacing the Upstream O2 Sensor? Yes → Replace the appropriate Upstream Oxygen Sensor. Perform Powertrain Verification Test VER-5A. No → Go To 6	All
6	If there are no possible causes remaining, replace the Catalytic Converter. View repair options. Repair Replace the Catalytic Converter.	All

Symptom:
P0432-2/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored and Set Condition:

P0432-2/1 CATALYTIC CONVERTER EFFICIENCY

When Monitored: After engine warm up to 147 deg. F, 180 seconds of open throttle operation, at a speed greater than 20 mph, with the engine at 1200-1700 rpm and MAP vacuum between 15.0 and 21.0 inches of mercury (Hg).

Set Condition: As catalyst efficiency deteriorates, the switch rate of the downstream O2 sensor approaches that of the upstream O2 sensor. If at any point during the test the switch ratio reaches a predetermined value a counter is incremented by one.

POSSIBLE CAUSES
CATALYST 2/1 EFFICIENCY DTC DOES NOT REOCCUR
ENGINE MECHANICAL PROBLEM
EXHAUST LEAK
ENGINE MECHANICAL PROBLEM
EXHAUST LEAK
CATALYTIC CONVERTER 2/1 DEFECTIVE
UPSTREAM O2 SENSOR OLDER THAN DOWNSTREAM O2 SENSOR

TEST	ACTION	APPLICABILITY
1	With the DRB, read the DTCs. Is the GLOBAL GOOD TRIP counter displayed and equal to zero? Yes → Go To 3 No → Go To 2	All
2	At this time the Catalyst Efficiency Failure does not exist or is an intermittent problem. With the DRB, read the FREEZE FRAME data. With this screen, attempt to duplicate the condition that has set this fault. While using FREEZE FRAME pay particular attention to the fault setting conditions, such as speed, temp, load, and map vacuum. Does the Catalyst Efficiency Failure Reoccur? Yes → Go To 3 No → The Catalytic Conveter Efficiency DTC no longer exists.	All
3	**Check the exhaust for excessive smoke from internal oil or coolant leaks.** Is there an oil or coolant consumption condition present? Yes → Repair engine mechanical condition as necessary and replace Catalytic Converter. Perform the Powertrain Verification Test - Ver 2. No → Go To 4	All

P0432-2/1 CATALYTIC CONVERTER EFFICIENCY — Continued

TEST	ACTION	APPLICABILITY
4	Start Engine and let idle. Check for exhaust leaks between the Engine and the appropriate Downstream O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform the Powertrain Verification Test - Ver 2. No → Go To 5	All
5	**Check the exhaust for excessive smoke from internal oil or coolant leaks.** Is there an oil or coolant consumption condition present? Yes → Repair engine mechanical condition as necessary and replace Catalytic Converter. Perform the Powertrain Verification Test - Ver 2. No → Go To 6	All
6	Start Engine and let idle. Check for exhaust leaks between the Engine and the appropriate Downstream O2 Sensor. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform the Powertrain Verification Test - Ver 2. No → Go To 7	All
7	**NOTE: A new Downstream O2 Sensor along with an aging Upstream O2 Sensor may cause this trouble code to set.** Review vehicle repair history. Has the Downstream O2 Sensor been replaced without replacing the Upstream O2 Sensor? Yes → Replace the appropriate Upstream Oxygen Sensor. Perform Powertrain Verification Test VER-5A. No → Go To 8	All
8	If there are no possible causes remaining, replace the Catalytic Converter. View repair options. Repair Replace the Catalytic Converter.	All

Symptom:
P0441-EVAP PURGE FLOW MONITOR

When Monitored and Set Condition:

P0441-EVAP PURGE FLOW MONITOR

When Monitored: With engine temperature greater than 76°C (170°F), fuel control in closed loop, engine idling for 2 minutes, no low fuel, MAP less than 15.7 inches mercury and barometric altitude less than 8,000 feet.

Set Condition: After having passed the Leak Detection Pump (LDP) test, no air flow through the evaporative system is detected by the evap monitor.

POSSIBLE CAUSES
EVAP CANISTER
VACUUM HARNESS INTERMITTENT
EVAP PURGE HOSE (CANISTER TO FUEL TANK)
EVAP PURGE HOSE (SOLENOID TO CANISTER)
EVAP PURGE SOLENOID VACUUM SUPPLY
PROPORTIONAL PURGE SOLENOID (STUCK CLOSED)
PROPORTIONAL PURGE SOLENOID DEFECTIVE

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0441? Yes → Go To 2 No → Go To 8	All
2	Visually inspect the Evap canister. Look for any physical damage or any signs of fuel that has entered the canister. Any signs of fuel may indicate a bad rollover valve. Were any problems found? Yes → Replace as necessary. Perform the Powertrain Verification Test - Ver 5. No → Go To 3	All
3	Visually inspect the Evap purge hose that goes between the Evap canister and the fuel tank. Look for any physical damage such as a pinched, pugged, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform Powertrain Verification Test VER-5. No → Go To 4	All

P0441-EVAP PURGE FLOW MONITOR — Continued

TEST	ACTION	APPLICABILITY
4	Visually inspect the Evap purge hose that goes from the Purge Solenoid to the Evap Canister. Look for any physical damage such as a pinched, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform Powertrain Verification Test VER-5. No → Go To 5	All
5	Turn ignition off. Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Also check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Inspect the vacuum nipple at the throttle body for any damage or plugging. Is the vacuum supply hose and throttle body vacuum nipple free from defects? Yes → Go To 6 No → Repair the vacuum supply hose/tube as necessary. Perform Powertrain Verification Test VER-5.	All
6	Turn ignition off. Disconnect the vacuum hoses at the Proportional Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Proportional Purge Solenoid vacuum source port. (component side) Does the Proportional Purge Solenoid hold vacuum? Yes → Go To 7 No → Replace the Proportional Purge Solenoid. Perform Powertrain Verification Test VER-5A.	All
7	Turn ignition off. Disconnect the vacuum hoses at the Proportional Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Proportional Purge Solenoid vacuum source port. (component side) With the DRB, actuate the ″EVAP Purge Solenoid″ and observe the vacuum gauge. Does the vacuum drop when the solenoid is actuated? Yes → Test Complete. No → Replace the Proportional Purge Solenoid. Perform Powertrain Verification Test VER-5A.	All
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the Proportional Purge Solenoid and vacuum harness. Look for any chafed, pierced, pinched, or partially broken hoses.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair vacuum harness/connections as necessary. Perform Powertrain Verification Test VER-5A. No → Test Complete.	All

Symptom List:

P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED
P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED.

When Monitored and Set Condition:

P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient.

Set Condition: If there is a leak larger than 0.040″ and smaller than 0.080″ in the evaporative system.

P0455-EVAP LEAK MONITOR LARGE LEAK DETECTED

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient.

Set Condition: There is a leak larger than 0.080″ in the evaporative system.

POSSIBLE CAUSES
CONFIRMED LEAK IN THE EVAP SYSTEM
INTERMITTENT LDP MONITOR FAILURE

TEST	ACTION	APPLICABILITY
1	**Note: A loose gas cap could have caused this DTC to set. Make sure gas cap is tight and in good condition.** Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 4	All

P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
2	To continue testing you will need Miller Tools #6872A (Evap System Pressure Pump) and #8382 (Gas Cap Tester/Adapter). **Warning: The test equipment is designed to be used to pressurize the vehicles Evaporative System only. Using the equipment in a manner for which it was not designed could be harmful.** **Warning: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **Note: The fuel tank should have between 3 and 9 gallons of fuel to properly test the Evap system.** Attach the power source clip (red) of Miller Tool #6872A to Battery (+) and the ground clip (black) to Battery (-). Perform the Evaporative System Pressure Pump self test that is specified on the tester cover. Remove gas cap and install Miller Tool #8382 on vehicle. Install gas cap to Miller Tool #8382. Attach the pressure supply hose from Miller Tool #6872A to the fitting on #8382. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect and apply a continuous vacuum supply (i.e. 20″Hg) to the Leak Detection Pump. A vacuum pump such as an A/C recovery unit works well. With the DRB in System Tests, select ″Leak Detect Pump Test.″ Read instructions and then press Enter. Select: #3 - HOLD PSI. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. **Note: If the pressure does not build up, there is obviously a large leak in the system and the presence of strong fuel odor may be present. A visual inspection should find a leak of substantial size.** When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Note the time and pressure. Did the pressure drop more than 6″H2O in 2 minutes? Yes → Go To 3 No → Go To 4	All
3	**Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** To continue testing, you will need Miller Tool #6904A (Ultrasonic Leak Detector.) **Note: The LDP System Test should still be running. If the DRB has timed out, restart the System Test.** Using Miller Tool #6872A, set the Pressure/Hold Switch to Open, and the Vent Switch to Closed. Turn the pump timer on to pressurize/re-pressurize the Evap System. Using the Ultrasonic Leak Detector, start listening for leaks in the Evap System. Carefully leak test all hoses, tubes, and connections. Were any leaks heard with the Ultrasonic Leak Detector? Yes → Repair or replace the leaking component as necessary. Perform Powertrain Verification Test VER-6. No → Test Complete. **Note: Perform a thorough visual inspection of the EVAP system hoses, tudes, and connections. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.**	All

P0442-EVAP LEAK MONITOR MEDIUM (.040) LEAK DETECTED — Continued

TEST	ACTION	APPLICABILITY
4	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRB in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. Perform Powertrain Verification Test VER-6. No → Test Complete.	All

Symptom:
P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored and Set Condition:

P0443-EVAP PURGE SOLENOID CIRCUIT

When Monitored: At ignition key on and the engine running.

Set Condition: Not powering down, not in limp-in and time since last solenoid activation is greater than 72 micro seconds. The PCM will set a trouble code if the actual state of the solenoid does not match the intended state.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
PWM PURGE SENSE CKT OPEN
PROPORTIONAL PURGE SOLENOID CONTROL CKT OPEN
PCM
PROPORTIONAL PURGE SOLENOID CONTROL CKT SHORTED TO GROUND
PWM PURGE SENSE CKT SHORTED TO GROUND
PROPORTIONAL PURGE SOLENOID

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-0443? Yes → Go To 2 No → Go To 8	All
2	Turn ignition off. Disconnect the Proportional Purge Solenoid electrical connector. Disconnect the Powertrain Control Module harness connector. Using an Ohmmeter, measure the resistance of the PWM Purge Sense circuit from the Proportional Purge Solenoid connector to the PCM connector. Is the resistance below 5.0 Ohms? Yes → Go To 3 No → Repair the open PWM Purge Sense circuit. Perform Powertrain Verification Test VER-5A.	All
3	Turn ignition off. Disconnect the Proportional Purge Solenoid electrical connector. Using an Ohmmeter, measure the resistance of the Proportional Purge Solenoid. Is the resistance between 13.0 and 15.0 Ohms? Yes → Go To 4 No → Replace the Proportional Purge Solenoid. Perform Powertrain Verification Test VER-5A.	All

P0443-EVAP PURGE SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Disconnect the Proportional Purge Solenoid electrical connector. Disconnect the Powertrain Control Module harness connector. Using an Ohmmeter, measure the Proportional Purge Solenoid Control circuit from the Proportional Purge Solenoid connector to the PCM connector. Is the resistance below 5.0 Ohms? Yes → Go To 5 No → Repair the open Proportional Purge Solenoid Control circuit. Perform Powertrain Verification Test VER-5A.	All
5	Turn ignition off. Disconnect the Proportional Purge Solenoid electrical connector. Disconnect the Powertrain Control Module harness connector. Using an Ohmmeter, measure the resistance between the Proportional Purge Solenoid Control circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the short to ground in the Proportional Purge Solenoid Control circuit. Perform Powertrain Verification Test VER-5A. No → Go To 6	All
6	Turn ignition off. Disconnect the Proportional Purge Solenoid electrical connector. Disconnect the Powertrain Control Module harness connector. Using an Ohmmeter, measure the resistance between the PWM Purge Sense circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the short to ground in the PWM Purge Sense circuit. Perform Powertrain Verification Test VER-5A. No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-5A.	All
8	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Perform a wiggle test of the Proportional Purge Solenoid wiring while the circuit is actuated with the DRB. Listen for the solenoid to quit actuating. Also watch for the Global Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-5A. No → Test Complete.	All

Symptom:

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES

When Monitored and Set Condition:

P0460-FUEL LEVEL UNIT NO CHANGE OVER MILES

When Monitored: Engine running and fuel level either below 15% or above 85% of capacity.

Set Condition: The PCM sees low fuel, less than 15%, for more than 120 miles or fuel level stays above 85% of capacity and does not change by at least 10% for more than 100 miles.

POSSIBLE CAUSES
PHYSICALLY DAMAGED/DEFORMED/OBSTRUCTED FUEL TANK
FUEL LEVEL SENSOR

TEST	ACTION	APPLICABILITY
1	**Note: Diagnose P0462 or P0463 first, if set along with P0460.** **Release fuel pressure using the following test steps.** Remove the fuel pump relay from the PDC. Start and run the engine until it stalls. Attempt to restart the engine until it will no longer run. Turn ignition off. Remove the fuel tank. Remove the fuel pump module from the fuel tank. Inspect the inside of the fuel tank for any obstructions or deformities. Is the fuel tank free from defects? Yes → Go To 2 No → Repair or replace the fuel tank as necessary. Perform Powertrain Verification Test VER-2A. **A fuel pump relay control circuit DTC may have been stored in the PCM memory due to the removal of the fuel pump relay. The DRB scan tool must be used to erase a DTC.**	All
2	If there are no possible causes remaining, replace the Fuel Level Sensor. View repair options. Repair Replace the fuel level sensor. Perform Powertrain Verification Test VER-2A.	All

Symptom List:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW
P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW.

When Monitored and Set Condition:

P0462-FUEL LEVEL SENDING UNIT VOLTS TOO LOW

When Monitored: Ignition on and battery voltage above 10.4 volts.

Set Condition: The fuel level sensor signal voltage goes below 0.4 volts for more than 90 seconds.

P0463-FUEL LEVEL SENDING UNIT VOLTS TOO HIGH

When Monitored: Ignition on and battery voltage above 10.4 volts.

Set Condition: The fuel level sensor signal voltage at the PCM goes above 9.9 volts for more than 90 seconds.

POSSIBLE CAUSES
FUEL PUMP MODULE WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	With the DRB, read the DTC's. Is the Warm-up Cycle counter equal to zero for P0462? Yes → Refer to symptom FUEL LEVEL SENDING UNIT FAILURE in the INSTRUMENT CLUSTER category. No → Go To 2	All
2	**Note: Visually inspect the wiring harness leading to the fuel pump module. Look for any parts of the wiring harness that may be pinched or rubbed through.** Turn ignition on. With the DRB, monitor the fuel level sensor voltage. Using the wiring diagrams for harness and connector location, wiggle the Fuel Pump Module harness and related connectors. Was there any fuel level sensor voltage change? Yes → Repair the wiring harness as necessary. Perform Powertrain Verification Test VER-2A. No → Test Complete.	All

Symptom:

P0500-NO VEHICLE SPEED SIGNAL

When Monitored and Set Condition:

P0500-NO VEHICLE SPEED SIGNAL

When Monitored: With the engine running, transmission not in park or neutral, brakes not applied, and engine rpm greater than 1500.

Set Condition: This code will set if no vehicle speed signal is received from the TCM (transmission control module) for more than 11 seconds for 2 consecutive trips.

POSSIBLE CAUSES
INTERMITTENT VEHICLE SPEED SIGNAL
VEHICLE SPEED SIGNAL CIRCUIT OPEN
VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO GROUND
VEHICLE SPEED SIGNAL CIRCUIT SHORTED TO VOLTAGE
POWERTRAIN CONTROL MODULE
TRANSMISSION CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	With the DRB III read DTC's. Is the Global Good Trip Counter for P-0500 displayed and Equal to 0? Yes → Go To 2 No → Go To 7	All
2	Turn ignition off. Disconnect the Transmission Control Module harness connector. Turn ignition on. Using a voltmeter, measure the Vehicle Speed Sensor Signal circuit at the Transmission Control Module harness connector. Is the voltage above 6.0 volts? Yes → Repair the short to voltage in the vehicle speed sensor signal circuit. Perform the Powertrain Verification Test - Ver 5 No → Go To 3	All

P0500-NO VEHICLE SPEED SIGNAL — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the Transmission Control Module harness connector. Connect a jumper wire to the Vehicle Speed Sensor Signal circuit in the Transmission Control Module harness connector. Turn ignition on. Quickly and repeatedly tap the jumper wire to ground. With the DRB III read the Vehicle Speed Signal display. Is the DRB reading Vehicle Speed above 0 MPH? Yes → Replace the Transmission Control Module. Perform the Powertrain Verification Test - Ver 5 No → Go To 4	All
4	Turn ignition off. Disconnect the Powertrain Control Module connectors. Disconnect the Transmission Control Module harness connector. Using an ohmmeter, measure the resistance of the Vehicle Speed Signal circuit between the PCM harness connector and the TCM harness connector. Is the resistance above 5.0 ohms? Yes → Repair the open in the vehicle speed sensor circuit. Perform the Powertrain Verification Test - Ver 5 No → Go To 5	All
5	Turn ignition off. Disconnect the Powertrain Control Module connectors. Disconnect the Transmission Control Module harness connector. Using an ohmmeter, measure the resistance of the Vehicle Speed Sensor Signal circuit to ground at the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the vehicle speed signal circuit. Perform the Powertrain Verification Test - Ver 5 No → Go To 6	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P0505-IDLE AIR CONTROL MOTOR CIRCUITS

When Monitored and Set Condition:

P0505-IDLE AIR CONTROL MOTOR CIRCUITS

When Monitored: At key on and battery voltage greater than 11.5 volts.

Set Condition: The PCM senses a short to ground or battery voltage on any of the four Idle Air Control (IAC) driver circuits for 2.75 seconds while the IAC motor is active.

POSSIBLE CAUSES
IAC MOTOR WIRING HARNESS OBSERVABLE
IAC MOTOR WIRING HARNESS INTERMITTENT
IAC #1 DRIVER CIRCUIT SHORTED TO #2, #3, OR #4
IAC #2 DRIVER CIRCUIT SHORTED TO #3 OR #4
IAC #3 DRIVER CIRCUIT SHORTED TO #4
IAC MOTOR
IAC #1 DRIVER CIRCUIT SHORTED TO GROUND
IAC #2 DRIVER CIRCUIT SHORTED TO GROUND
IAC #3 DRIVER CIRCUIT SHORTED TO GROUND
IAC #4 DRIVER CIRCUIT SHORTED TO GROUND
IAC #1 DRIVER CIRCUIT OPEN
IAC #2 DRIVER CIRCUIT OPEN
IAC #3 DRIVER CIRCUIT OPEN
IAC #4 DRIVER CIRCUIT OPEN
POWERTRAIN CONTROL MODULE (IAC #1 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #2 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #3 DRIVER)
POWERTRAIN CONTROL MODULE (IAC #4 DRIVER)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P0505? Yes → Go To 2 No → Go To 22	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
2	Start engine and let idle. Disconnect the IAC Motor Connector. **Note: Check connectors - Clean/repair as necessary.** Using a Voltmeter, measure the voltage of the IAC #1 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 3 No → Go To 19	All
3	Start engine and let idle. Disconnect the IAC Motor Connector. **Note: Check connectors - Clean/repair as necessary.** Using a Voltmeter, measure the voltage of the IAC #2 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 4 No → Go To 16	All
4	Start engine and let idle. Disconnect the IAC Motor Connector. **Note: Check connectors - Clean/repair as necessary.** Using a Voltmeter, measure the voltage of the IAC #3 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 5 No → Go To 13	All
5	Start engine and let idle. Disconnect the IAC Motor Connector. **Note: Check connectors - Clean/repair as necessary.** Using a Voltmeter, measure the voltage of the IAC #4 Driver Circuit. Was the voltage over 5.0 volts at any time? Yes → Go To 6 No → Go To 10	All
6	Ignition Off Disconnect IAC Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the IAC Driver Circuits.** Using an Ohmmeter, measure the resistance between the IAC #1 Driver circuit and #2, #3, #4 Driver circuits. Is the resistance below 5.0 ohms on any of the Drivers? Yes → Repair the IAC Driver Circuits shorted together. Perform the Powertrain Verification Test - Ver 5. No → Go To 7	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
7	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the IAC Driver Circuits.** Using an Ohmmeter, measure the resistance between the IAC #2 Driver circuit and #3, #4 Driver circuits. Is the resistance below 5.0 ohms on any of the Drivers? Yes → Repair the IAC Driver Circuits shorted together. Perform the Powertrain Verification Test - Ver 5. No → Go To 8	All
8	Ignition Off Disconnect IAC Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** **Note: The following steps are checking for a short between the Driver Circuits.** Using an Ohmmeter, measure the resistance between the IAC #3 Driver circuit and #4 Driver circuit. Is the resistance below 5.0 ohms? Yes → Repair the IAC Driver Circuits shorted together. Perform the Powertrain Verification Test - Ver 5. No → Go To 9	All
9	If there are no possible causes remaining, replace the Idle Air Control Motor. View repair options. Repair Replace the Idle Air Control Motor. Perform Powertrain Verification Test VER-5A.	All
10	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the IAC #4 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 11 No → Repair the open IAC Driver Circuit. Perform the Powertrain Verification Test - Ver 5.	All
11	Ignition Off Disconnect IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance between IAC Driver #4 and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the IAC #4 Driver Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 12	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
12	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
13	Ignition Off Disconnect IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance between IAC Driver #3 and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the IAC #3 Driver Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 14	All
14	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the IAC #3 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair the open IAC Driver Circuit. Perform the Powertrain Verification Test - Ver 5.	All
15	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
16	Ignition Off Disconnect IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance between IAC #2 Driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the IAC #2 Driver Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 17	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
17	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the IAC #2 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 18 No → Repair the open IAC Driver Circuit. Perform the Powertrain Verification Test - Ver 5.	All
18	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
19	Ignition Off Disconnect IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance between IAC #1 Driver circuit and ground (B-). Is the resistance below 5.0 ohms? Yes → Repair the IAC #1 Driver Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 20	All
20	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the IAC #1 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 21 No → Repair the open IAC Driver Circuit. Perform the Powertrain Verification Test - Ver 5.	All
21	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
22	Ignition Off Inspect the IAC Wiring and Connectors from the IAC motor to the PCM. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 5. No → Go To 23	All

P0505-IDLE AIR CONTROL MOTOR CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
23	Start engine. With the DRB in Systems Test, perform the IAC Wiggle Test. **Note: The idle speed should raise and lower with the display.** Wiggle the Wiring Harness from the IAC Motor to the PCM. Observe for the IAC Motor to stop operating. Did the IAC Motor stop operating at any time? Yes → Repair the Harness or Connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
P0551-POWER STEERING SWITCH FAILURE

When Monitored and Set Condition:

P0551-POWER STEERING SWITCH FAILURE

When Monitored: With the ignition key on and engine running.

Set Condition: With the vehicle above 40 mph for over 30 seconds, the power steering pressure switch remains open.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT PROBLEM
POWER STEERING PRESSURE SWITCH GROUND CIRCUIT OPEN
POWER STEERING PRESSURE SWITCH
POWER STEERING PRESSURE SWITCH SENSE CIRCUIT SHORTED TO GROUND
POWER STEERING SWITCH SENSE CIRCUIT OPEN
PCM

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 7	All
2	Turn Ignition Off Disconnect the Power Steering Pressure Switch connector. Using an Ohmmeter, measure the resistance of the Ground Circuit at the Power Steering Pressure Switch connector to a good Ground. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open Power Steering Pressure Switch Ground Circuit. Perform the Powertrain Verification Test - Ver 5.	All
3	Turn ignition off. Disconnect the Power Steering Pressure Switch Connector. Turn ignition on. Connect a Jumper Wire to the Power Steering Pressure Switch Sense Circuit. Using the DRB, while monitoring the Power Steering Pressure Switch, touch the Jumper Wire to the Ground Circuit at the Power Steering Pressure Switch harness connector several times. Did the Power Steering Pressure Switch status change from Hi to Low? Yes → Replace the Power Steering Pressure Switch. Perform the Powertrain Verification Test - Ver 5. No → Go To 4	All

P0551-POWER STEERING SWITCH FAILURE — Continued

TEST	ACTION	APPLICABILITY
4	Turn Ignition Off. Disconnect the Power Steering Pressure Switch Connector. Disconnect the Powertrain Control Module connector. With an Ohmmeter, measure the Power Steering Pressure Switch Sense Circuit to ground at the PCM connector. Is the resistance below 5.0 ohms? Yes → Repair the Power Steering Pressure Switch Sense Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 5	All
5	Turn Ignition Off. Disconnect the Power Steering Pressure Switch Connector. Disconnect the Powertrain Control Module connector. Using an Ohmmeter, measure resistance of Power Steering Pressure Switch Sense circuit from PCM connector to Sensor Connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open Power Steering Switch Sense Circuit. Perform the Powertrain Verification Test - Ver 5.	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
7	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
P0700-EATX CONTROLLER DTC PRESENT

POSSIBLE CAUSES
EATX CONTROLLER DTC PRESENT

TEST	ACTION	APPLICABILITY
1	**Note: This PCM trouble code indicates that there is a DTC stored in the Transmission Control Module (TCM).** With the DRBIII®, erase DTC stored in the PCM, after making the transmission repair. **Note: Erase P0700 code in the PCM to turn the MIL light off after making transmission repairs.** View repair options. Repair With the DRBIII®, read and repair the stored DTC's in the Transmission Control Module. Perform the 42LE Transmission Verification Test - Ver 1.	All

Symptom List:

P0703-BRAKE SWITCH SENSE CIRCUIT
***BRAKE SWITCH SENSE STATUS DOES NOT CHANGE ON DRB**

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P0703-BRAKE SWITCH SENSE CIRCUIT.

When Monitored and Set Condition:

P0703-BRAKE SWITCH SENSE CIRCUIT

When Monitored: With the engine running. The PCM expects the signal to be high for 16 cycles while it monitors the brake switch signal during accel and decel modes.

Set Condition: After the vehicle speed increases, the PCM must accumulate 6 seconds while delta throttle voltage is above 0.02 volts. The count is reset to zero whenever the brake switch indicates a low signal.

POSSIBLE CAUSES
BRAKE SWITCH GROUND CIRCUIT OPEN
BRAKE SWITCH SENSE CIRCUIT OPEN
PCM (BRAKE SENSE)
BRAKE SWITCH (SENSE CIRCUIT)
BRAKE SWITCH SENSE CIRCUIT SHORT TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn ignition off. Disconnect the Brake Switch Connector. Using an ohmmeter, measure the resistance of the Brake Switch Ground Circuit to a good ground. Is the resistance below 5.0 ohms? Yes → Go To 2 No → Repair the open Brake Switch Ground Circuit. Perform the Powertrain Verification Test - Ver 4	All
2	Turn ignition off. Disconnect the Brake Switch Connector. Disconnect the PCM connector. Using an ohmmeter, measure the resistance of the Brake Switch Sense Circuit between the Brake Switch and the PCM. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open Brake Switch Sense Circuit. Perform the Powertrain Verification Test - Ver 4	All

P0703-BRAKE SWITCH SENSE CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the Brake Switch Connector. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between the Brake Switch Sense terminal and the Ground terminal (measurement taken across switch). Apply and release the Brake Pedal while monitoring the ohmmeter. Does the resistance change from below 5.0 ohms to open circuit? Yes → Go To 4 No → Replace the Brake Switch. Perform the Powertrain Verification Test - Ver 4	All
4	Turn ignition off. Disconnect the Brake Switch harness connector. Disconnect the PCM harness connector. Using an ohmmeter, measure the resistance of the Brake Switch Sense Circuit at the Brake Switch Connector to a good ground. Is the resistance below 5.0 ohms? Yes → Repair the Brake Switch Sense Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 4 No → Go To 5	All
5	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 4	All

Symptom List:

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR
P1196-2/1 O2 SENSOR SLOW DURING CATALYST MONITOR

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR.

When Monitored and Set Condition:

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR

When Monitored: With the engine running, coolant greater than 170°F, open throttle, steady to slightly increasing vehicle speed greater than 18 mph but less than 55 mph, with a light load on the engine, for a period no less than 5 minutes.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volt to above 0.6 volts and back fewer times than required.

P1196-2/1 O2 SENSOR SLOW DURING CATALYST MONITOR

When Monitored: With the engine running, coolant greater than 170°F, open throttle, steady to slightly increasing vehicle speed greater than 18 mph but less than 55 mph, with a light load on the engine, for a period no less than 5 minutes.

Set Condition: The oxygen sensor signal voltage is switching from below 0.39 volt to above 0.6 volts and back fewer times than required.

POSSIBLE CAUSES
EXHAUST LEAK
EXCESSIVE ENGINE BLOWBY
O2S SENSOR GROUND CIRCUIT VOLTAGE DROP
O2S SIGNAL CIRCUIT VOLTAGE DROP
WIRING HARNESS INTERMITTENT
O2S

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 7	All

P1195-1/1 O2 SENSOR SLOW DURING CATALYST MONITOR — Continued

TEST	ACTION	APPLICABILITY
2	Start engine. Allow engine to idle. Check for any exhaust leaks between the Engine and the appropriate O2S. Are there any exhaust leaks? Yes → Repair or replace leaking exhaust parts as necessary. Perform the Powertrain Verification Test - Ver 2. No → Go To 3	All
3	Start engine. Allow the engine to reach normal operating temperature. Check the exhaust for excessive smoke from internal oil or coolant leaks. Is there an oil or coolant consumption condition present? Yes → Repair engine for excessive blowby (oil or coolant) as necessary. Perform the Powertrain Verification Test - Ver 2. No → Go To 4	All
4	Turn ignition off. Using a Voltmeter, backprobe the O2S Ground ckt using one of the meter leads, using the other meter lead backprobe the O2S Ground circuit at the PCM connector. Ensure the voltmeter leads are connected for positive polarity. Start engine. Allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 5 No → Repair high resistance on O2S Sensor Ground circuit. Perform the Powertrain Verification Test - Ver 5.	All
5	Turn ignition off. Using a Voltmeter, backprobe the O2S Signal ckt using one of the meter leads, using the other meter lead backprobe the O2S Signal circuit at the PCM connector. Ensure the voltmeter leads are connected for positive polarity. Start engine. Allow the engine to reach normal operating temperature. Is the voltage below 0.10 volt? Yes → Go To 6 No → Repair high resistance on O2S Signal circuit. Perform Powertrain Verification Test VER-5A.	All
6	If there are no potential causes remaining, replace the O2S. View repair options. Repair Replace the O2S. Perform Powertrain Verification Test VER-5A.	All
7	Turn the ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-5A. No → Test Complete.	All

Symptom:
P1282-FUEL PUMP RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1282-FUEL PUMP RELAY CONTROL CIRCUIT

When Monitored: With the ignition on and battery voltage above 10.4 volts.

Set Condition: An open or shorted condition is detected in the fuel pump relay control circuit.

POSSIBLE CAUSES
FUEL PUMP RELAY WIRING HARNESS OBSERVABLE
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
FUEL PUMP RELAY
FUEL PUMP RELAY CONTROL CIRCUIT OPEN
FUEL PUMP RELAY CONTROL CIRCUIT SHORTED TO GROUND
FUEL PUMP RELAY WIRING HARNESS INTERMITTENT
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, actuate the Fuel Pump Relay. Is the Fuel Pump Relay clicking? Yes → Go To 2 No → Go To 4	All
2	Turn ignition off. Using the wiring diagram as a guide, inspect the fuel pump relay wiring and connectors. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 2. No → Go To 3	All
3	Turn ignition on. With the DRB, actuate the Fuel Pump Relay. Wiggle the wiring harness from the Fuel Pump Relay to the PCM while the relay is actuating. Did the Relay clicking stop or become irregular when wiggling the wires? Yes → Repair Circuit as necessary where wiggling caused clicking to stop or become irregular. Perform the Powertrain Verification Test - Ver 2. No → Test Complete.	All

P1282-FUEL PUMP RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Remove the fuel pump relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Turn ignition on. Using a voltmeter, measure the fused ignition switch output circuit at the fuel pump relay connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open fused ignition switch output circuit. NOTE: Check for a blown fuse. Perform the Powertrain Verification Test - Ver 2	All
5	Turn ignition off. Remove the fuel pump relay from the PDC. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between terminals 1 (85) and 2 (86) of the fuel pump relay. Is the resistance between 50 and 90 ohms? Yes → Go To 6 No → Replace the fuel pump relay. Perform the Powertrain Verification Test - Ver 2	All
6	Turn ignition off. Remove the fuel pump relay from the PDC. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the fuel pump relay control circuit from the fuel pump relay connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open fuel pump relay control circuit. Perform the Powertrain Verification Test - Ver 2	All
7	Turn ignition off. Remove the fuel pump relay from the PDC. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an ohmmeter, measure the resistance between the fuel pump relay control circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the fuel pump relay control circuit for a short to ground. Perform the Powertrain Verification Test - Ver 2 No → Go To 8	All
8	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 2	All

Symptom:
P1288-SHORT RUNNER SOLENOID CIRCUIT

POSSIBLE CAUSES
PCM
SRV SOLENOID
SRV SOLENOID CONTROL CKT OPEN
SRV SOLENOID SHORTED TO GND
ASD RELAY OUTPUT CKT
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read DTC's. Is the global good trip counter equal to 0? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition on. Disconnect the SRV solenoid harness connector. Using a 12-volt Test Light, connect a end to the ASD relay output ckt and the other end to the SRV solenoid control ckt at the SRV solenoid harness connector. With the DRB, actuate the SRV solenoid. Does the 12 volt test light flash on and off? Yes → Replace the Short Runner Valve Solenoid. No → Go To 3	All
3	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the SRV solenoid harness connector. Measure the resistance of the SRV solenoid control circuit from the SRV solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open in the SRV solenoid control circuit.	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the SRV solenoid harness connector. Measure the SRV solenoid circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the SRV solenoid circuit. No → Go To 5	All

P1288-SHORT RUNNER SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Disconnect the SRV solenoid harness connector. Turn the ignition on. With the DRB, actuate the Short Runner Valve solenoid. Measure the voltage between ASD relay output circuit and ground. Is the voltage above the 10.0 volts? Yes → Go To 6 No → Repair the ASD relay output circuit.	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. No → Replace the Powertrain Control Module.	All
7	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. No → Test Complete.	All

Symptom:

P1289-MANIFOLD TUNE VALVE CONTROL CIRCUIT

POSSIBLE CAUSES
MTV SOLENOID
MTV SOLENOID CONTROL CKT OPEN
MTV SOLENOID SHORTED TO GND
PCM
WIRING HARNESS INTERMITTENT
ASD RELAY OUTPUT CKT OPEN
ASD RELAY OUTPUT CKT SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, read DTC's. Is the global good trip counter equal to 0 for DTC P1289? Yes → Go To 2 No → Go To 9	All
2	Disconnect the MTV solenoid harness connector. Turn the ignition on. With the DRB, actuate the Manifold Tune Valve solenoid. Measure the voltage between ASD relay output circuit and ground. Is the voltage above the 10.0 volts? Yes → Go To 3 No → Go To 7	All
3	Turn the ignition on. Disconnect the MTV solenoid harness connector. Using a 12-volt Test Light, connect a end to the ASD relay output ckt and the other end to the MTV solenoid control ckt at the MTV solenoid harness connector. With the DRB, actuate the MTV solenoid. Does the 12 volt test light flash on and off? Yes → Replace the Manifold Tune Valve Solenoid. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV solenoid harness connector. Measure the resistance of the MTV solenoid control circuit from the MTV solenoid harness connector and the PCM harness connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open in the MTV solenoid control circuit.	All

P1289-MANIFOLD TUNE VALVE CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
5	Turn the ignition off. Disconnect the PCM harness connector. Disconnect the MTV solenoid harness connector. Measure the MTV solenoid circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the MTV solenoid circuit. No → Go To 6	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module.	All
7	Turn the ignition off. Disconnect the MTV solenoid harness connector. Remove the ASD relay. Measure the resistance of the ASD relay output ckt between the ASD relay connector and the MTV solenoid harness connector. Is the resistance below 5.0 ohms? Yes → Go To 8 No → Repair the open in the ASD relay output circuit.	All
8	Turn the ignition off. **Note: Repeat the following test for both capacitors.** **Note: The Capacitors are attached to the side of each valve cover.** Disconnect the Capacitor harness connector. Install a good INJ/COIL fuse. With the DRB, actuate the ASD Relay. **Note: If the above test result is an open INJ/COIL fuse the problem is a short to ground in the ASD Relay Output circuit. Repair the short to ground in the ASD Relay Output circuit and refer to verification test 5.** Is the INJ/COIL fuse OK? Yes → Replace the Capactitor(s).	All
9	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. No → Test Complete.	All

Symptom:
P1294-TARGET IDLE NOT REACHED

When Monitored and Set Condition:

P1294-TARGET IDLE NOT REACHED

When Monitored: With the engine idling and in drive, if automatic. There must not be a MAP sensor trouble code or a throttle position sensor trouble code.

Set Condition: Engine idle is not within 200 rpm above or 100 rpm below target idle for 14 seconds. One bad trip is required to set the DTC.

POSSIBLE CAUSES
THROTTLE BODY
THROTTLE PLATE/LINKAGE BINDING
VACUUM LEAK
THROTTLE BODY DIRTY

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Good Trip Counter displayed and equal to zero for P-1294? Yes → Go To 2 No → Test Complete.	All
2	Turn ignition off. Check the throttle plate and linkage for a binding condition. The throttle linkage must be at idle position. Ensure the throttle plate is fully closed and against it's stop. Is the throttle plate and linkage free from defects? Yes → Go To 3 No → Repair as necessary. Perform the Powertrain Verification Test - Ver 5.	All
3	Inspect the Intake Manifold for vacuum leaks. Inspect the Power Brake Booster for any vacuum leaks. Inspect the PCV system for proper operation or any vacuum leaks. Were any problems found? Yes → Repair vacuum leak as necessary. Perform the Powertrain Verification Test - Ver 5. No → Go To 4	All

P1294-TARGET IDLE NOT REACHED — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Disconnect the hose from the PCV valve and cap the nipple on the PCV valve. Disconnect purge hose from the nipple on the throttle body. Start the engine. Ensure that all accessories are off. Allow the engine to reach operating temperature above 82°C (180°F). With the DRB in System Tests, perform the ″Minimum Air Flow″ function. Is the engine RPM between 550 and 1300? Yes → Test Complete. No → Go To 5 **Caution: Stop all actuations. Turn engine off.**	All
5	Turn ignition off. Remove the Throttle Body. **Warning: Clean throttle body in a well ventilated area. Wear rubber or butyl gloves. Do not let cleaner come in contact with eyes or skin. Avoid injesting cleaner. Wash thoroughly after using cleaner.** While holding the throttle open, spray the entire throttle body bore and the manifold side of the throttle plate with Mopar Parts Cleaner. Clean the IAC motor passage also. Use compressed air to dry the throttle body. Re-install the throttle body. **Note: Miller Tool #6457 (0.125″ air metering orifice) still attached to the purge nipple on the throttle body.** Start the engine. Ensure that all accessories are off. Allow the engine to reach operating temperature above 82°C (180°F). With the DRB in System Tests, perform the ″Minimum Air Flow″ function. Is the engine RPM between 550 and 1300? Yes → Repair complete. Perform the Powertrain Verification Test - Ver 5. No → Replace the Throttle Body. Perform the Powertrain Verification Test - Ver 5. **Caution: Stop all actuations. Turn engine off.**	All

Symptom:

P1297-NO CHANGE IN MAP FROM START TO RUN

When Monitored and Set Condition:

P1297-NO CHANGE IN MAP FROM START TO RUN

When Monitored: With engine RPM above 400 but less than 1500 and the throttle blade at closed throttle.

Set Condition: Too small a difference is seen between barometric pressure at ignition on and manifold vacuum (engine running) for 1.72 seconds.

POSSIBLE CAUSES
MAP SENSOR WIRING HARNESS INTERMITTENT
MAP SENSOR WIRING HARNESS INTERMITTENT PROBLEM
MAP SENSOR WIRING HARNESS OBSERVABLE PROBLEM
VACUUM PORTS RESTRICTED
MAP SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
MAP SENSOR 5-VOLT SUPPLY CIRCUIT SHORTED TO GROUND
MAP SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
MAP SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
MAP SENSOR
MAP SENSOR (NO PRESS CHANGE)
MAP SENSOR (PRESS CHANGE)
MAP SENSOR RESTRICTED
PCM (5-VOLT SUPPLY)
PCM (SIGNAL CIRCUIT)

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running With the DRB, read DTC's. Is the ″MAP sensor voltage too low″ DTC set? Yes → Go To 2 No → Go To 14	All
2	Start engine. Let engine idle. With the DRB, read the MAP Sensor voltage. Is the MAP Sensor voltage below 0.6 volts? Yes → Go To 4 No → Go To 3	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
3	Ignition On, Engine Not Running. With the DRB, read the MAP Sensor voltage. Is the MAP Sensor voltage below 3.19 volts? Yes → Go To 4 No → Go To 12	All
4	Turn ignition off. Disconnect the MAP Sensor Electrical Connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Use a Voltmeter in the following step. Measure the MAP Sensor 5-Volt Supply Circuit. Is the voltage above 4.5 volts? Yes → Go To 5 No → Go To 9	All
5	Turn ignition off. Disconnect the MAP Sensor Electrical Connector. **Note: Check connectors - Clean/repair as necessary.** Ignition on, engine not running. Use the DRB to read MAP Sensor voltage. Is the MAP Sensor voltage above 4.5 volts? Yes → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A. No → Go To 6	All
6	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure resistance between the MAP Sensor Signal Circuit and the MAP Sensor Ground Circuit. Is the resistance below 5.0 ohms? Yes → Repair MAP Sensor Signal Circuit shorted to MAP Sensor Ground Circuit. Perform Powertrain Test Verification VER-5A. No → Go To 7	All
7	Turn the ignition off. Disconnect the MAP Sensor harness Connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure resistance of MAP Sensor Signal circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the MAP Sensor Signal Circuit for a short to ground. Perform Powertrain Test Verification VER-5A. No → Go To 8	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
8	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Test Verification VER-5A.	All
9	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the MAP Sensor 5-Volt Supply Circuit from the MAP Sensor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open 5-Volt Supply Circuit. Perform the Powertrain Verification Test - Ver 5.	All
10	Turn ignition off. Disconnect the MAP Sensor Electrical Connector. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the MAP Sensor 5-Volt Supply Circuit for resistance to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5-Volt Supply Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 11	All
11	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Test Verification VER-5A.	All
12	Turn ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Test Verification VER-5A. No → Go To 13	All
13	**Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Start engine. With the DRB, read the MAP Sensor voltage. Wiggle MAP Sensor Connector & Harness. Monitor the DRB display. Was there any MAP Sensor voltage change? Yes → Repair the Harness or Connector that caused the voltage change. Perform Powertrain Test Verification VER-5A. No → Test Complete.	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
14	Ignition On, Engine Not Running With the DRB, erase codes. Start engine and allow engine to idle for 30 seconds. With the DRB, read the DTC's. Does the DRB show ″No change in MAP from start to run″? Yes → Go To 15 No → Go To 18	All
15	Turn the ignition off. Disconnect the MAP Sensor harness connector. Disconnect the Powertrain Control Module harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the MAP Sensor 5-Volt Supply Circuit from the MAP Sensor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 16 No → Repair the open 5-Volt Supply Circuit. Perform the Powertrain Verification Test - Ver 5.	All
16	Turn ignition off. Remove the MAP Sensor and inspect the condition of Vacuum Port. Was there a restriction? Yes → Remove the restriction and reinstall the MAP Sensor. Perform Powertrain Verification Test VER-5A. No → Go To 17	All
17	If there are no possible causes remaining, replace the MAP sensor. View repair options. Repair Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A.	All
18	Start engine. With the DRB, set the engine speed to 1500 RPM. With the engine RPM at 1500, read MAP Sensor voltage. While monitoring the voltage, wiggle the Wiring from the MAP Sensor to PCM. Did the engine stall or voltage become erratic? Yes → Repair the Wiring or Connector defect between the MAP Sensor and the PCM. Perform Powertrain Test Verification VER-5A. No → Go To 19	All
19	Start engine. While monitoring the DRB display, Quickly Open and Close Throttle several times. Did the Vacuum drop below 1.0″? Yes → Test Complete. No → Go To 20	All

P1297-NO CHANGE IN MAP FROM START TO RUN — Continued

TEST	ACTION	APPLICABILITY
20	Turn ignition off. Remove the MAP Sensor and inspect condition of Vacuum Port. Inspect condition of Intake Manifold or Throttle Body Vacuum Port. Is there a restriction or defect in the Vacuum Ports? Yes → Repair the restricted or defective Vacuum Ports. Perform Powertrain Test Verification VER-5A. No → Go To 21	All
21	If there are no potential causes remaining, the replace MAP Sensor. View repair options. Repair Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A.	All

Symptom:
P1299-VACUUM LEAK FOUND (IAC FULLY SEATED)

When Monitored and Set Condition:

P1299-VACUUM LEAK FOUND (IAC FULLY SEATED)

When Monitored: With the engine running.

Set Condition: The MAP sensor signal does not correlate to the TPS signal.

POSSIBLE CAUSES
VACUUM LEAK
MAP SENSOR DEFECTIVE (OUT OF CALIBRATION)
TPS DEFECTIVE (VOLTAGE GREATER THAN 1.5 AT REST)
TPS DEFECTIVE (VOLTAGE LESS THAN 3.4 AT WIDE OPEN THROTTLE)

TEST	ACTION	APPLICABILITY
1	**Note: A large vacuum leak is the most likely cause of this DTC.** Inspect the Intake Manifold for vacuum leaks. Inspect the Power Brake Booster for any vacuum leaks. Inspect the PCV system for proper operation or any vacuum leaks. Were any problems found? Yes → Repair vacuum leak as necessary. Perform the Powertrain Verification Test - Ver 5. No → Go To 2	All
2	**Note: Throttle must be fully closed and against throttle stop.** Turn ignition on. With the DRB in Sensors, read the Throttle Position Sensor voltage. Is the voltage 1.5 volts or less with the throttle closed? Yes → Go To 3 No → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5.	All
3	Turn ignition off. Tee-in a vacuum gauge to a manifold vacuum source. Start the engine and allow to idle. **Note: If the engine will not idle, maintain a constant RPM above idle.** With the DRB in Sensors, read the MAP Sensor Vacuum value. Is the DRB reading within 1″ of the teed-in vacuum gauge? Yes → Go To 4 No → Replace the MAP Sensor. Perform the Powertrain Verification Test - Ver 5.	All

P1299-VACUUM LEAK FOUND (IAC FULLY SEATED) — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition on. With the DRB in Sensors, monitor the Throttle Position Sensor voltage while slowly opening the throttle to wide open. Is the maximum voltage at least 3.4 volts at wide open throttle? Yes → Test Complete. No → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5.	All

Symptom:

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT

When Monitored and Set Condition:

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT

When Monitored: With ignition key on and battery voltage above 10.4 volts.

Set Condition: An open or shorted condition is detected in the ASD relay control circuit.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT PROBLEM
FUSED B+ CIRCUIT OPEN
ASD RELAY CONTROL CIRCUIT OPEN
ASD RELAY CONTROL CIRCUIT SHORTED TO GROUND
ASD RELAY
PCM

TEST	ACTION	APPLICABILITY
1	With the DRB, actuate the Auto Shutdown Relay. Is the Auto Shutdown Relay Clicking? No → Go To 2 Yes → Go To 7	All
2	Turn ignition off. Remove the ASD relay from the PDC. Disconnect the Powertrain Control Module. Using an ohmmeter, measure the resistance of the ASD relay control circuit from the ASD relay connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open ASD relay control circuit. Perform the Powertrain Verification Test - Ver 2.	All
3	Turn ignition off. Remove the ASD relay from the PDC. Using a voltmeter, measure both Fused B+ circuits at the ASD Relay connector. Is the voltage above 10.0 volts for both B(+) Circuits? Yes → Go To 4 No → Repair the open fused B+ circuit. Note: Check fuse in the PDC. Perform the Powertrain Verification Test - Ver 2.	All

P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Remove the ASD relay from the PDC. Disconnect the Powertrain Control Module. Using an ohmmeter, measure the ASD relay control circuit to ground. Is the resistance below 5.0 ohms? Yes → Repair the ASD Relay control circuit for a short to ground. Perform the Powertrain Verification Test - Ver 2. No → Go To 5	All
5	Turn ignition off. Remove the ASD relay from the PDC. Using an ohmmeter, measure the resistance between terminals 1(85) and 2(86) of the ASD relay. Is the resistance between 50.0 and 90.0 ohms? Yes → Go To 6 No → Replace the ASD Relay. Perform the Powertrain Verification Test - Ver 2.	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-2A.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-2A. No → Test Complete.	All

Symptom:
P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM

When Monitored and Set Condition:

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM

When Monitored: With ignition key on, battery voltage above 10.4 volts, and engine RPM greater than 400.

Set Condition: No voltage sensed at the PCM when the ASD relay is energized.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT PROBLEM
ASD RELAY OUTPUT CIRCUIT OPEN
FUSED B+ CIRCUIT OPEN
ASD RELAY
PCM
PCM DEFECTIVE

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is DTC P1388 set? Yes → Refer to symptom P1388-AUTO SHUTDOWN RELAY CONTROL CIRCUIT in the DRIVEABILITY category. No → Go To 2	All
2	With the DRB, erase the trouble codes. Attempt to start the engine. If the engine will not start, crank the engine for at least 15 seconds. Does the trouble code reset? If necessary, crank the engine several times. Yes → Go To 3 No → Go To 10	All
3	Attempt to start the engine. If the engine will not start, crank the engine for at least 15 seconds. Did the engine start? Yes → Go To 4 No → Go To 6	All

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Remove the ASD relay from the PDC. Disconnect the Powertrain Control Module. Using an ohmmeter, measure the resistance of the ASD relay output circuit from the ASD Relay connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open ASD Relay output circuit. Perform the Powertrain Verification Test - Ver 2.	All
5	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-2A.	All
6	Turn ignition off. Remove the ASD relay from the PDC. Disconnect the Powertrain Control Module. Using an ohmmeter, measure the resistance of the ASD relay output circuit from the ASD Relay connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open ASD Relay output circuit. Perform the Powertrain Verification Test - Ver 2.	All
7	Turn ignition off. Remove the ASD relay from the PDC. Using a voltmeter, measure both Fused B+ circuits at the ASD Relay connector. Is the voltage above 10.0 volts for both B(+) Circuits? Yes → Go To 8 No → Repair the open fused B+ circuit. Note: Check fuse in the PDC. Perform the Powertrain Verification Test - Ver 2.	All
8	Install a substitute relay for the Auto Shutdown Relay. Attempt to start the vehicle. Did the engine start? Yes → Replace the ASD Relay. Perform the Powertrain Verification Test - Ver 2. No → Go To 9	All
9	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-2A.	All

P1389-NO ASD RELAY OUTPUT VOLTAGE AT PCM — Continued

TEST	ACTION	APPLICABILITY
10	At this time, the conditions required to set the DTC are not present. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform Powertrain Verification Test VER-2A. No → Test Complete.	All

Symptom:
P1391-INTERMITTENT LOSS OF CMP OR CKP

When Monitored and Set Condition:

P1391-INTERMITTENT LOSS OF CMP OR CKP

When Monitored: Engine running or cranking.

Set Condition: When the failure counter reaches 20 for 2 consecutive trips.

POSSIBLE CAUSES
DAMAGED TONE WHEEL/FLEX PLATE (CRANKSHAFT)
DAMAGED TONE WHEEL/PULSE RING (CAMSHAFT)
INTERMITTENT CMP SIGNAL LOSS WHEN WIRING IS WIGGLED
INTERMITTENT CKP SIGNAL LOSS WHEN WIRING IS WIGGLED
IRREGULAR LAB SCOPE PATTERN OF CKP SIGNAL
IRREGULAR LAB SCOPE PATTERN OF CMP SIGNAL
CAMSHAFT POSITION SENSOR
SENSOR CONNECTOR/WIRING
CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P1391? Yes → Go To 2 No → Go To 13	All
2	Turn ignition off. With the DRB lab scope, backprobe the CMP signal circuit at the CMP sensor connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the CMP sensor voltage pattern on the lab scope screen. Are there any signals missing? Yes → Go To 3 No → Go To 6	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 4	All
4	Turn ignition off. Disconnect and remove the camshaft position sensor. Inspect the tone wheel/pulse ring for looseness and/or physical damage. Is the tone wheel/pulse ring free from defects? Yes → Go To 5 No → Repair/replace tone wheel/pulse ring as necessary.	All
5	If there are no possible causes remaining, replace the Camshaft Position Sensor. View repair options. Repair Replace the Camshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. With the DRB lab scope, backprobe the CKP signal circuit at the CKP sensor connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the CKP sensor voltage pattern on the lab scope screen. Are there any signals missing? Yes → Go To 7 No → Go To 10	All
7	Turn ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 8	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
8	Turn ignition off. Disconnect and remove the crankshaft position sensor. Inspect the tone wheel/flexplate slots for damage, foreign material, or excessive movement. Is the tone wheel/flexplate free from defects? Yes → Go To 9 No → Repair/replace tone wheel/flex plate as necessary.	All
9	If there are no possible causes remaining, replace the Crankshaft Position Sensor. View repair options. Repair Replace the Crankshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5	All
10	Turn ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 11	All
11	Turn ignition off. With the DRB lab scope, backprobe the CMP signal circuit at the PCM connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors related to the CMP sensor. Were there any irregularities in the lab scope pattern when the wiggle test was conducted? Yes → Note where wiggling caused a missing CMP sensor signal. Repair CMP sensor wiring as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 12	All

P1391-INTERMITTENT LOSS OF CMP OR CKP — Continued

TEST	ACTION	APPLICABILITY
12	Turn ignition off. With the DRB lab scope, backprobe the CKP signal circuit at the PCM connector using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors related to the CKP sensor. Were there any irregularities in the lab scope pattern when the wiggle test was conducted? Yes → Note where wiggling caused a missing CKP sensor signal. Repair CKP sensor wiring as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All
13	Turn ignition off. Connect the DRBIII lab scope to the CMP signal circuit. For best results, backprobe at the PCM using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Camshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5 No → Go To 14	All
14	Turn ignition off. **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the Camshaft Position Sensor and/or the Crankshaft Position Sensor is tight.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 15	All
15	Turn ignition off. Connect the DRBIII lab scope to the CKP signal circuit. For best results, backprobe at the PCM using Miller special tool #6801. **Warning: Keep clear of the engine's moving parts.** Start the engine. Observe the lab scope screen while wiggling the wiring harness and connectors. Were there any irregularities in the lab scope pattern? Yes → Check harness and connectors carefully. If OK, replace the Crankshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All

Symptom:
P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT

When Monitored and Set Condition:

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT

When Monitored: Under closed throttle decel with A/C off, ECT above 75, and more than 50 seconds after engine start.

Set Condition: One of the CKP sensor target windows has more than 2.86% variance from the reference window.

POSSIBLE CAUSES
DAMAGED TONE WHEEL/FLEX PLATE (CRANKSHAFT)
CKP SENSOR CONNECTOR/WIRING
CRANKSHAFT POSITION SENSOR
IMPROPERLY INSTALLED/LOOSE CRANKSHAFT POSITION SENSOR

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P1398? Yes → Go To 4 No → Go To 2	All
2	**Note: Check for any TSB's that may apply to this symptom.** Read and record the Freeze Frame Data. Use this information to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load. Turn ignition on. (engine off) With the DRB in the miscellaneous menu, choose ″Clear PCM (battery disconnect)″ to reset the PCM. With the DRB, choose the ″Mis-Fire Pre-test″ screen. Road test the vehicle and re-learn the adaptive numerator. The adaptive numerator is learned when the ″Adaptive Numerator Done Learning″ line on the Mis-fire Pre-test screen changes to ″Yes″. Also the ″200 Rev Cntr″ line will start to count. Did the adaptive numerator re-learn? Yes → Go To 3 No → Go To 4	All

P1398-MIS-FIRE ADAPTIVE NUMERATOR AT LIMIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. **Note: Visually inspect the Crankshaft Position Sensor and related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the sensor mounting bolt(s) are tight.** Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 5 No → Test Complete.	All
4	Turn ignition off. **Note: Visually inspect the Crankshaft Position Sensor and related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Make sure the sensor mounting bolt(s) are tight.** Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 5 No → Go To 5	All
5	Turn ignition off. Disconnect the Crankshaft Position Sensor connector. **Note: Visually inspect the related wiring harness/connectors. Look for broken, bent, pushed out or corroded terminals.** Inspect the Crankshaft Position Sensor for proper installation and tightness. Is the Crankshaft Position Sensor properly installed and the mounting bolt(s) tight? Yes → Go To 6 No → Repair as necessary. Perform the Powertrain Verification Test - Ver 5	All
6	Turn ignition off. Disconnect and remove the crankshaft position sensor. Inspect the tone wheel/flexplate slots for damage, foreign material, or excessive movement. Is the tone wheel/flexplate free from defects? Yes → Go To 7 No → Repair/replace tone wheel/flex plate as necessary.	All
7	If there are no possible causes remaining, replace the Crankshaft Position Sensor. View repair options. Repair Replace the Crankshaft Position Sensor. Perform the Powertrain Verification Test - Ver 5	All

Symptom:

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND

When Monitored and Set Condition:

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient.

Set Condition: LDP test must pass first. If the PCM suspects a pinched hose it will not set a fault until it runs the evap purge flow monitor. If the purge monitor does not pass then the pinched hose fault will be set.

POSSIBLE CAUSES
EVAP CANISTER OBSTRUCTED
LDP PRESSURE HOSE OBSTRUCTED
LEAK DETECTION PUMP
INTERMITTENT LDP MONITOR FAILURE
OBSTRUCTION IN EVAP SYSTEM BETWEEN EVAP CANISTER AND FUEL TANK
OBSTRUCTION IN HOSE/TUBE BETWEEN EVAP CANISTER AND PURGE SOLENOID

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P1486? Yes → Go To 2 No → Go To 6	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
2	To continue testing you will need Miller Tools #6872A (Evap System Pressure Pump) and #8382 (Gas Cap Tester/Adapter). **Warning: The test equipment is designed to be used to pressurize the vehicles Evaporative System only. Using the equipment in a manner for which it was not designed could be harmful.** **Warning: Keep lighted cigarettes, sparks, flames, and other ignition sources away from the test area to prevent the ignition of explosive gases. Keep the test area well ventilated.** **Note: The fuel tank should have between 3 and 9 gallons of fuel to properly test the Evap system.** Attach the power source clip (red) of Miller Tool #6872A to Battery (+) and the ground clip (black) to Battery (-). Perform the Evaporative System Pressure Pump self test that is specified on the tester cover. Remove gas cap and install Miller Tool #8382 on vehicle. Install gas cap to Miller Tool #8382. Attach the pressure supply hose from Miller Tool #6872A to the fitting on #8382. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect and apply a continuous vacuum supply (i.e. 20″Hg) to the Leak Detection Pump. A vacuum pump such as an A/C recovery unit works well. With the DRB in System Tests, select ″Leak Detect Pump Test.″ Read instructions and then press Enter. Select: #3 - HOLD PSI. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the hose at the EVAP Canister that goes to the Fuel Tank. Did the pressure drop when the hose was disconnected? Yes → Go To 3 No → Repair obstruction in the EVAP system between the EVAP Canister and the fuel tank. Perform Powertrain Verification Test VER-6.	All
3	**Note: All previously disconnected hose(s) reconnected.** Re-pressurize the EVAP System. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the LDP Pressure hose at the EVAP Canister. The LDP Pressure hose is the hose that connects the Evap Canister to the Leak Detection Pump. Did the pressure drop when the hose was disconnected? Yes → Go To 4 No → Replace the EVAP Canister. Perform the Powertrain Verification Test - Ver 6.	All

P1486-EVAP LEAK MONITOR PINCHED HOSE FOUND — Continued

TEST	ACTION	APPLICABILITY
4	**Note: All previously disconnected hose(s) reconnected.** Re-pressurize the EVAP System. On Miller Tool #6872A, set the Pressure/Hold switch to Open and set the Vent switch to Closed. Turn the pump timer On and watch the gauge. When the gauge pressure reaches 14″H2O, turn the Pressure/Hold Valve to Closed. Turn the pump timer off. Disconnect the EVAP hoses at the Purge Solenoid. Did the pressure drop when the hose was disconnected? Yes → Go To 5 No → Repair or replace hose/tube as necessary. Perform Powertrain Verification Test VER-6.	All
5	Disconnect and remove the LDP pressure hose. The LDP pressure hose is the hose that connects the EVAP Canister to the Leak Detection Pump. Inspect the LDP pressure hose for any obstructions or physical damage. Is the LDP pressure hose free from defects? Yes → Replace the Leak Detection Pump. Perform Powertrain Verification Test VER-6. No → Repair/replace hose as necessary. Perform the Powertrain Verification Test - Ver 6.	All
6	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: A thorough visual inspection of the Evap system hoses, tubes, and connections may save time in your diagnosis. Look for any physical damage or signs of wetness at connections. The strong smell of fuel vapors may aid diagnosis also.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** With the DRB in System Tests, perform the LDP Monitor Test. This will force the PCM to run the LDP Monitor. If the monitor fails, further diagnosis is required to find faulty component. If the monitor passes, the condition is not present at this time. Were any problems found? Yes → Repair as necessary. Perform Powertrain Verification Test VER-6. No → Test Complete.	All

Symptom:

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT

When Monitored and Set Condition:

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT

When Monitored: With the ignition key on, battery voltage greater than 10.0 volts and the PCM requests the radiator fan to be turned on.

Set Condition: An open or shorted circuit is detected in the radiator fan relay control circuit.

POSSIBLE CAUSES
RADIATOR FAN CTRL RLY CIRCUIT WIRE HARN INTERMITTENT PROBLEM
RADIATOR FAN CTRL RLY CIRCUIT WIRE HARN OBSERVABLE PROBLEM
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT SHORT TO GROUND
RADIATOR FAN CONTROL RELAY
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate the High Speed Radiator Fan relay. Does the Radiator Fan Relay Cycle on and off? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRB, actuate the Radiator Fan relay. Wiggle the Wiring Harness from the Relay(s) to the Powertrain Control Module. Did the wiggling interrupt the Radiator Fan Motor cycling? Yes → Repair as necessary where wiggling caused the cycling to be interrupted. Perform the Powertrain Verification Test - Ver 2 No → Go To 3	All
3	Turn the ignition off. Using the Schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

P1489-HIGH SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the Radiator Fan Relay. Measure the voltage of the Fused Ignition Switch Output circuit at the relay connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open Fused Ignition Switch Output circuit.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Remove the Radiator Fan Relay. Measure the resistance of the Radiator Fan Relay Control Circuit from the Relay to the PCM. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open Radiator Fan Relay Control Circuit. Perform the Powertrain Verification Test - Ver 2	All
6	Turn the ignition off. Remove the Radiator Fan Relay. Disconnect the PCM harness connector. Measure the resistance between the Radiator Fan Relay Control circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the Radiator Fan Relay Control Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 2 No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Turn the ignition on. Connect a jumper wire to the Radiator Fan Relay Control Circuit at PCM. Momentarily connect the other end of the jumper wire to a good ground. Did the Radiator Fan Relay actuate? Yes → Go To 8 No → Replace the Radiator Fan Relay. Perform the Powertrain Verification Test - Ver 2	All
8	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 2	All

Symptom:

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT

When Monitored and Set Condition:

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT

When Monitored: With the ignition key on, battery voltage greater than 10.0 volts and the PCM requests the radiator fan to be turned on.

Set Condition: An open or shorted circuit is detected in the radiator fan relay control circuit.

POSSIBLE CAUSES
RADIATOR FAN CTRL RLY CIRCUIT WIRE HARN INTERMITTENT PROBLEM
RADIATOR FAN CTRL RLY CIRCUIT WIRE HARN OBSERVABLE PROBLEM
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT OPEN
RADIATOR FAN RELAY CONTROL CIRCUIT SHORT TO GROUND
RADIATOR FAN CONTROL RELAY
PCM

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate the Low Speed Radiator Fan relay. Does the Radiator Fan Relay Cycle on and off? Yes → Go To 2 No → Go To 4	All
2	Turn the ignition on. With the DRB, actuate the Radiator Fan relay. Wiggle the Wiring Harness from the Relay(s) to the Powertrain Control Module. Did the wiggling interrupt the Radiator Fan Motor cycling? Yes → Repair as necessary where wiggling caused the cycling to be interrupted. Perform the Powertrain Verification Test - Ver 2 No → Go To 3	All
3	Turn the ignition off. Using the Schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

P1490-LOW SPEED FAN CONTROL RELAY CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Remove the Radiator Fan Relay. Measure the voltage of the Fused Ignition Switch Output circuit at the relay connector. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open Fused Ignition Switch Output circuit.	All
5	Turn the ignition off. Disconnect the PCM harness connector. Remove the Radiator Fan Relay. Measure the resistance of the Radiator Fan Relay Control Circuit from the Relay to the PCM. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open Radiator Fan Relay Control Circuit. Perform the Powertrain Verification Test - Ver 2	All
6	Turn the ignition off. Remove the Radiator Fan Relay. Disconnect the PCM harness connector. Measure the resistance between the Radiator Fan Relay Control circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the Radiator Fan Relay Control Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 2 No → Go To 7	All
7	Turn the ignition off. Disconnect the PCM harness connector. Turn the ignition on. Connect a jumper wire to the Radiator Fan Relay Control Circuit at PCM. Momentarily connect the other end of the jumper wire to a good ground. Did the Radiator Fan Relay actuate? Yes → Go To 8 No → Replace the Radiator Fan Relay. Perform the Powertrain Verification Test - Ver 2	All
8	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 2	All

Symptom:

P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT

When Monitored and Set Condition:

P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT

When Monitored: Immediately after a cold start, with battery/ambient temperature between 4°C (40°F) and 32°C (90°F) and coolant temperature within -12°C (10°F) of battery/ambient.

Set Condition: The state of the switch does not change when the solenoid is energized.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
LDP SWITCH SENSE CIRCUIT OPEN
LDP SWITCH SENSE CIRCUIT SHORTED TO GROUND
LDP VACUUM SUPPLY
LEAK DETECTION PUMP
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-1494? Yes → Go To 2 No → Go To 7	All
2	Turn ignition off. Disconnect the vacuum supply hose at the Leak Detection Pump. Connect a vacuum gauge to the disconnected vacuum supply hose at the Leak Detection Pump. Start the engine and read the vacuum gauge. Does the vacuum gauge read at least 13 in/Hg? Yes → Go To 3 No → Repair leak or obstruction in vacuum hose as necessary. Perform Powertrain Verification Test VER-5.	All

P1494-LEAK DETECT PUMP SW OR MECHANICAL FAULT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the Leak Detection Pump electrical connector. Turn ignition on. With the DRB in Inputs/Outputs, read the ″Leak Detect Pump Sw″ state. While observing the ″Leak Detect Pump Sw″ state, connect a jumper wire between the Fused Ignition Switch Output circuit and the LDP Switch Sense circuit. Did the ″Leak Detect Pump Sw″ state change when the jumper was connected? Yes → Replace the Leak Detection Pump. Perform Powertrain Verification Test VER-5A. No → Go To 4	All
4	Turn ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Using an Ohmmeter, measure the resistance of the LDP Switch Sense circuit from the LDP connector to the PCM connector. Is the resistance below 5.0 Ohms? Yes → Go To 5 No → Repair the open LDP Switch Sense Circuit. Perform Powertrain Verification Test VER-5.	All
5	Turn ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Using an Ohmmeter, measure the resistance between the LDP Switch Sense circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Switch Sense Circuit for a short to ground. Perform Powertrain Verification Test VER-5. No → Go To 6	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-5.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** Perform a wiggle test of the LDP wiring while the circuit is actuated with the DRB. Listen for the LDP to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored and Set Condition:

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT

When Monitored: Immediately after a cold start, with battery/ambient temperature between 40 deg. F and 90 deg. F and coolant temperature within 10 deg. F of battery/ambient.

Set Condition: The state of the solenoid circuit does not match the PCM's desired state.

POSSIBLE CAUSES
WIRING HARNESS INTERMITTENT
FUSED IGNITION SWITCH OUPUT CIRCUIT OPEN
LDP SOLENOID CONTROL CIRCUIT OPEN
LDP SOLENOID CONTROL CIRCUIT SHORTED TO GROUND
LEAK DETECTION PUMP FUNCTION
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Turn ignition on. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero for P-1495? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the Leak Detection Pump harness connector. Turn the ignition on. With a test light, connect one end to the fused ignition switch output circuit and the other end to the LDP solenoid control circuit at the LDP harness connector. With the DRB, actuate the Leak Detection Pump. Does the test light flash on and off? Yes → Replace the Leak Detection Pump. Perform Powertrain Verification Test VER-5A. No → Go To 3	All

P1495-LEAK DETECTION PUMP SOLENOID CIRCUIT — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the Leak Detection Pump electrical connector. Turn ignition on. Using a 12 volt test light connected to ground, check the Fused Ignition Switch Output Circuit at the LDP connector. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the open Fused Ignition Switch Output Circuit. Perform the Powertrain Verification Test - Ver 5.	All
4	Turn ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Using an Ohmmeter, measure the resistance of the LDP Solenoid Control circuit from the LDP connector to the PCM connector. Is the resistance below 5.0 Ohms? Yes → Go To 5 No → Repair the open LDP Solenoid Control Circuit. Perform Powertrain Verification Test VER-5.	All
5	Turn ignition off. Disconnect the Leak Detection Pump electrical connector. Disconnect the Powertrain Control Module connectors. Using an Ohmmeter, measure the resistance between the LDP Solenoid Control circuit and ground. Is the resistance below 5.0 Ohms? Yes → Repair the LDP Solenoid Control Circuit for a short to ground. Perform Powertrain Verification Test VER-5. No → Go To 6	All
6	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform Powertrain Verification Test VER-5.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB's) that may apply.** Perform a wiggle test of the LDP wiring while the circuit is actuated with the DRB. Listen for the LDP to quit actuating. Also watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
P1496-5 VOLT SUPPLY, OUTPUT TOO LOW

When Monitored and Set Condition:

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW

When Monitored: With the ignition on.

Set Condition: The 5-volt supply to the sensors is below 3.5 volts for 4 seconds.

POSSIBLE CAUSES
5 VOLT SUPPLY SHORTED TO GROUND
EGR SOLENOID
A/C PRESSURE SENSOR
MAP SENSOR
TPS
WIRING HARNESS INTERMITTENT PROBLEM
PCM

TEST	ACTION	APPLICABILITY
1	Turn Ignition On. With the DRB, read the DTC's. Is the Global Good Trip Counter displayed and equal to zero? Yes → Go To 2 No → Go To 9	All
2	Turn ignition off. Disconnect the Throttle Position Sensor Connector. Turn ignition on. With a Voltmeter, measure the 5 Volt Supply Circuit at the Throttle Positon Sensor Connector. Is the Voltage below 4.5 Volts? Yes → Go To 3 No → Go To 8	All

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn the ignition off. Disconnect the TPS harness connector. Turn the ignition on. Connect a Voltmeter to the 5 Volt Supply Circuit at the Throttle Position Sensor Connector. Record Voltage Reading. Turn the ignition off. Disconnect the EGR Solenoid harness connector. Turn the ignition on. Read and record the 5 Volt Supply Circuit voltage at the Throttle Position Sensor Connector. Did the 5 Volt Supply go from below 4.5 volts to above 4.5 volts when the EGR was disconnected? Yes → Replace the EGR Solenoid. Perform the Powertrain Verification Test - Ver 5. No → Go To 4	All
4	Turn the ignition off. Disconnect the TPS harness connector. Turn the ignition on. Connect a Voltmeter to the 5 Volt Supply Circuit at the Throttle Position Sensor Connector. Record Voltage Reading. Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Read and record the 5 Volt Supply Circuit voltage at the Throttle Position Sensor Connector. Did the 5 Volt Supply go from below 4.5 volts to above 4.5 volts when the sensor was disconnected? Yes → Replace the A/C Pressure Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 5	All
5	Turn ignition off. Disconnect the Throttle Position Sensor Connector. Turn ignition on. Connect a Voltmeter to the 5 Volt Supply Circuit at the Throttle Position Sensor Connector. Record Voltage Reading. Turn ignition off. Disconnect the MAP Sensor Connector. Turn ignition on. Read and record the 5 Volt Supply Circuit voltage at the Throttle Position Sensor Connector. Did the 5 Volt Supply go from below 4.5 volts to above 4.5 volts when the MAP was disconnected? Yes → Replace the MAP Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 6	All

P1496-5 VOLT SUPPLY, OUTPUT TOO LOW — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Throttle Position Sensor harness connector. Disconnect the MAP Sensor harness connector. Disconnect the PCM harness connectors. Disconnect the A/C Pressure Sensor harness connector. Disconnect the EGR Solenoid harness connector. Using an ohmmeter, measure the resistance of the 5 Volt Supply Cirucit from the Throttle Position Sensor Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the 5 Volt Supply Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 5. No → Go To 7	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All
8	**Note: The Throttle Position Sensor Connector must be connected during this test.** Disconnect the MAP Sensor Connector. Turn ignition on. With a Voltmeter, measure the 5 Volt Supply Circuit at the MAP Sensor Connector. Is the Voltage below 4.5 Volts? Yes → Replace the Throttle Position Sensor. Perform the Powertrain Verification Test - Ver 5. No → Go To 9	All
9	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
*CHECKING BRAKE SWITCH OPERATION WITH NO DTC'S

POSSIBLE CAUSES
DRB DOES NOT SHOW BRAKE SW PRESSED OR RELEASED
BRAKE LAMP SWITCH OUTPUT LESS THAN 10.0 VOLTS
FUSED B(+) CIRCUIT OPEN
S/C BR SW OUTPUT LESS THAN 10V AT BRAKE SWITCH

TEST	ACTION	APPLICABILITY
1	Ignition on, with engine not running. With the DRBIII® in Inputs/Outputs, monitor the Brake Lamp Switch state. While observing the display, press the Brake Pedal several times. Does the DRBIII® show Brake Switch ″pressed″ and ″released″? Yes → The Brake Lamp Switch is operating properly at this time. Perform the Appropriate Verification Test. No → Go To 2	All
2	**Note: Repair all Speed Control Related DTC's before continuing.** Start engine. Turn S/C to On/Off switch to the On position. Using a 12-volt test light, backprobe the S/C brake switch output circuit at the brake switch connector while depressing the brake pedal several times. Did the light turn on when the pedal was released and off when the pedal was pressed? Yes → Go To 3 No → Replace or adjust the brake switch. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
3	Turn ignition off. Using a 12-volt test light, check the fused B(+) circuit at the brake switch. Is the light illuminated and bright? Yes → Go To 4 No → Repair the fused B(+) circuit for an open or high resistance. Perform the Powertrain Verification Test - Ver 2	All
4	Turn ignition off. Brake pedal must be depressed in the next step. Using a 12-volt test light, check the brake lamp switch output at the brake switch. Is the light illuminated and bright? Yes → Test Complete. No → Replace or adjust the brake switch. Perform the Powertrain Verification Test - Ver 2	All

Symptom:
*CHECKING ENGINE MECHANICAL SYSTEMS

POSSIBLE CAUSES
DRIVEABILITY PROBLEM ENGINE MECHANICAL

TEST	ACTION	APPLICABILITY
1	It is suggested to perform the following mechanical checks after all engine electrical systems and DTC's have been repaired, or confirmed to be operating properly. **Warning: The following tests may be performed with the engine running: avoid contact with rotating components.** ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions ENGINE PCV SYSTEM - must flow freely ENGINE DRIVE SPROCKET - must be properly positioned TORQUE CONVERTER STALL SPEED - must be within specifications (auto only) POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 2. No → Test Complete.	All

Symptom:
*CHECKING ENGINE VACUUM

POSSIBLE CAUSES
DRIVEABILITY PROBLEM ENGINE MECHANICAL

TEST	ACTION	APPLICABILITY
1	Ignition Off Connect a vacuum gauge to the engine. Start engine and allow engine to idle for at least one minute. **Note: A normal vacuum reading will vary according to the altitude.** While monitoring the vacuum gauge, snap the Throttle open a few times. Observe the vacuum gauge readings and compare to sample graphic. Are the vacuum gauge readings normal? Yes → Test Complete. No → Go To 2	All
2	It is suggested to perform the following mechanical checks after all engine electrical systems and DTC's have been repaired, or confirmed to be operating properly. **Warning: The following tests may be performed with the engine running: avoid contact with rotating components.** ENGINE VACUUM - must be at least 13 inches in neutral ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions ENGINE PCV SYSTEM - must flow freely ENGINE DRIVE SPROCKET - must be properly positioned TORQUE CONVERTER STALL SPEED - must be within specifications (auto only) POWER BRAKE BOOSTER - no internal vacuum leaks FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 2. No → Test Complete.	All

Symptom:
*CHECKING EVAPORATIVE EMISSION SYSTEM

POSSIBLE CAUSES
EVAP CANISTER
EVAP PURGE HOSE (CANISTER TO FUEL TANK)
EVAP PURGE HOSE (SOLENOID TO CANISTER)
EVAP PURGE SOLENOID VACUUM SUPPLY
PROPORTIONAL PURGE SOLENOID (STUCK CLOSED)
PROPORTIONAL PURGE SOLENOID DEFECTIVE

TEST	ACTION	APPLICABILITY
1	Visually inspect the Evap canister. Look for any physical damage or any signs of fuel that has entered the canister. Any signs of fuel may indicate a bad rollover valve. Were any problems found? Yes → Replace as necessary. Perform the Powertrain Verification Test - Ver 5. No → Go To 2	All
2	Visually inspect the Evap purge hose that goes between the Evap canister and the fuel tank. Look for any physical damage such as a pinched, pugged, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform Powertrain Verification Test VER-5. No → Go To 3	All
3	Visually inspect the Evap purge hose that goes from the Purge Solenoid to the Evap Canister. Look for any physical damage such as a pinched, ripped or dry rotted hose. Were any problems found? Yes → Repair or replace hose as necessary. Perform Powertrain Verification Test VER-5. No → Go To 4	All
4	Turn ignition off. Carefully inspect the Evap Purge Solenoid vacuum supply hose for proper routing. Also check for a pinched or plugged hose from the throttle body to the Purge Solenoid. Inspect the vacuum nipple at the throttle body for any damage or plugging. Is the vacuum supply hose and throttle body vacuum nipple free from defects? Yes → Go To 5 No → Repair the vacuum supply hose/tube as necessary. Perform Powertrain Verification Test VER-5.	All

*CHECKING EVAPORATIVE EMISSION SYSTEM — Continued

TEST	ACTION	APPLICABILITY
5	Turn ignition off. Disconnect the vacuum hoses at the Proportional Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Proportional Purge Solenoid vacuum source port. (component side) Does the Proportional Purge Solenoid hold vacuum? Yes → Go To 6 No → Replace the Proportional Purge Solenoid. Perform Powertrain Verification Test VER-5A.	All
6	Turn ignition off. Disconnect the vacuum hoses at the Proportional Purge Solenoid. Using a hand vacuum pump, apply 10 inches of vacuum to the Proportional Purge Solenoid vacuum source port. (component side) With the DRB, actuate the ″EVAP Purge Solenoid″ and observe the vacuum gauge. Does the vacuum drop when the solenoid is actuated? Yes → Test Complete. No → Replace the Proportional Purge Solenoid. Perform Powertrain Verification Test VER-5A.	All

Symptom:
*CHECKING FUEL DELIVERY

POSSIBLE CAUSES
FUEL FILTER/PRESSURE REGULATOR (HIGH)
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
HIGH RESISTANCE IN THE FUEL PUMP RELAY OUTPUT CIRCUIT
FUEL PUMP INLET STRAINER PLUGGED
HIGH RESISTANCE IN THE FUEL PUMP GROUND CIRCUIT
FUEL PUMP MODULE
KINKED/RESTRICTED FUEL SUPPLY LINE

TEST	ACTION	APPLICABILITY
1	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** **Note: 2.7L engines require the use of Miller Tool #6539 (adapter) installed in-line to the fuel supply line. Disconnect the fuel supply line at the fuel rail connection, install tool #6539, then connect a fuel pressure gauge to tool #6539.** **Note: 3.2L/3.5L engines have a pressure test port on the fuel rail. Remove the pressure test port cap at the fuel rail test port. Connect a fuel pressure gauge to the test port pressure fitting on the fuel rail.** Ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 406 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 2 Within Specification Go To 7 Above Specification Replace the fuel filter/pressure regulator. **Caution: Stop All Actuations.**	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Turn ignition on. With the DRB, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, check the fuel pump relay output circuit (A141) at connector C308. Does the test light illuminate brightly? Yes → Go To 3 No → Repair the high resistance in the fuel pump relay ouput circuit. Check wire from PDC to fuel pump module connector. Also check for bad relay. Perform Powertrain Verification Test VER-1A. **Caution: Stop All Actuations.**	All
3	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to B+, check the fuel pump ground circuit (Z1) at connector C308. Does the test light illuminate brightly? Yes → Go To 4 No → Repair the high resistance in the fuel pump ground circuit. Perform Powertrain Verification Test VER-1 **Note: Re-connect connector C308 before performing the next test.**	All
4	Visually inspect the fuel supply line from the fuel tank to the fuel rail. Look for any signs of physical damage that may restrict the supply line. Were any problems found with the fuel supply line? Yes → Repair/replace fuel supply line as necessary. No → Go To 5	All
5	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. No → Go To 6	All
6	If there are no possible causes remaining, replace the Fuel Pump Module. View repair options. Repair Replace the Fuel Pump Module.	All

*CHECKING FUEL DELIVERY — Continued

TEST	ACTION	APPLICABILITY
7	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** With the DRB, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Test Complete. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. **Caution: Stop All Actuations.**	All

Symptom:

*CHECKING IAC MOTOR OPERATION WITH NO DTC'S

POSSIBLE CAUSES
IAC #1 DRIVER CIRCUIT OPEN
IAC #2 DRIVER CIRCUIT OPEN
IAC #3 DRIVER CIRCUIT OPEN
IAC #4 DRIVER CIRCUIT OPEN
POWERTRAIN CONTROL MODULE (IAC DRIVER)

TEST	ACTION	APPLICABILITY
1	Start the engine. With the DRB in Systems Test, perform the IAC Wiggle Test. **Note: The idle speed should raise and lower with the display.** Does the Idle Speed raise and lower properly? Yes → Test Complete. No → Go To 2	All
2	Start engine and let idle. Disconnect the IAC Motor Connector. **Note: Check connectors - Clean/repair as necessary.** Using a Voltmeter, measure the voltage of each IAC Driver Circuit at the IAC connector. Was the voltage over 5.0 volts at any time on each circuit? Yes → Test Complete. No → Go To 3	All
3	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the IAC #4 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair the open IAC Driver Circuit. Perform the Powertrain Verification Test - Ver 5.	All
4	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the IAC #1 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open IAC Driver Circuit. Perform the Powertrain Verification Test - Ver 5.	All

*CHECKING IAC MOTOR OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
5	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the IAC #2 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open IAC Driver Circuit. Perform the Powertrain Verification Test - Ver 5.	All
6	Ignition Off Disconnect the IAC Motor Connector. Disconnect the Powertrain Control Module connectors. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the IAC #3 Driver Circuit from the IAC Motor Connector to the PCM Connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open IAC Driver Circuit. Perform the Powertrain Verification Test - Ver 5.	All
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 5.	All

Symptom:

***CHECKING MAP SENSOR OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
MAP SENSOR (OUT OF CALIBRATION)

TEST	ACTION	APPLICABILITY
1	Turn ignition off. Connect a Vacuum Gauge to a Manifold Vacuum source. Start the engine. Allow the engine to idle. **Note: If engine will not idle, maintain a constant RPM above idle.** Using the DRB in Sensors, read the MAP Sensor vacuum value. Is the DRB reading within 1″ of the Vacuum Gauge reading? Yes → Test Complete. No → Replace the MAP Sensor. Perform Powertrain Verification Test VER-5A.	All

Symptom:
*CHECKING MINIMUM IDLE AIRFLOW

POSSIBLE CAUSES
THROTTLE BODY
THROTTLE PLATE/LINKAGE BINDING
VACUUM LEAK
THROTTLE BODY DIRTY

TEST	ACTION	APPLICABILITY
1	Turn ignition off. Check the throttle plate and linkage for a binding condition. The throttle linkage must be at idle position. Ensure the throttle plate is fully closed and against it's stop. Is the throttle plate and linkage free from defects? Yes → Go To 2 No → Repair as necessary. Perform the Powertrain Verification Test - Ver 5.	All
2	Inspect the Intake Manifold for vacuum leaks. Inspect the Power Brake Booster for any vacuum leaks. Inspect the PCV system for proper operation or any vacuum leaks. Were any problems found? Yes → Repair vacuum leak as necessary. Perform the Powertrain Verification Test - Ver 5. No → Go To 3	All
3	Turn ignition off. Disconnect the hose from the PCV valve and cap the nipple on the PCV valve. Disconnect purge hose from the nipple on the throttle body. Start the engine. Ensure that all accessories are off. Allow the engine to reach operating temperature above 82°C (180°F). With the DRB in System Tests, perform the ″Minimum Air Flow″ function. Is the engine RPM between 550 and 1300? Yes → Test Complete. No → Go To 4 **Caution: Stop all actuations. Turn engine off.**	All

*CHECKING MINIMUM IDLE AIRFLOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Remove the Throttle Body. **Warning: Clean throttle body in a well ventilated area. Wear rubber or butyl gloves. Do not let cleaner come in contact with eyes or skin. Avoid injesting cleaner. Wash thoroughly after using cleaner.** While holding the throttle open, spray the entire throttle body bore and the manifold side of the throttle plate with Mopar Parts Cleaner. Clean the IAC motor passage also. Use compressed air to dry the throttle body. Re-install the throttle body. **Note: Miller Tool #6457 (0.125″ air metering orifice) still attached to the purge nipple on the throttle body.** Start the engine. Ensure that all accessories are off. Allow the engine to reach operating temperature above 82°C (180°F). With the DRB in System Tests, perform the ″Minimum Air Flow″ function. Is the engine RPM between 550 and 1300? Yes → Repair complete. Perform the Powertrain Verification Test - Ver 5. No → Replace the Throttle Body. Perform the Powertrain Verification Test - Ver 5. **Caution: Stop all actuations. Turn engine off.**	All

Symptom:

***CHECKING RADIATOR FAN OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
FUSED B(+) CIRCUIT OPEN
RADIATOR FAN GROUND CIRCUIT OPEN
RADIATOR FAN MOTOR DEFECTIVE
RADIATOR FAN RELAY OUTPUT CIRCUIT OPEN
RADIATOR FAN RELAY

TEST	ACTION	APPLICABILITY
1	Turn the ignition on. With the DRB, actuate the High and Low Speed Radiator Fan relays. Did the Radiator Fan Motor Cycle on and off during both actuations? Yes → Test Complete. No → Go To 2	All
2	Turn the ignition on. With the DRB, actuate both Radiator Fan relays (one at a time). Using a 12-Volt Test Light, backprobe the appropriate Radiator Fan Relay Output Circuit at the Fan Connector. Does the light blink on and off? Yes → Go To 3 No → Go To 5	All
3	Turn the ignition off. Disconnect the Radiator Fan Motor Connector. Measure the resistance of both Radiator Fan Ground Circuits to ground. Is the resistance below 5.0 ohms for both grounds? Yes → Go To 4 No → Repair the open Radiator Fan Ground Circuit(s). Perform the Powertrain Verification Test - Ver 2	All
4	If there are no possible causes remaining, replace the Radiator Fan Motor. View repair options. Repair Replace the Radiator Fan Motor. Perform the Powertrain Verification Test - Ver 2	All
5	Turn the ignition off. Remove the Radiator Fan Relays. Using a 12-Volt Test Light, check the Fused B(+) Circuit at both Relay Connectors. Is the light illuminated and bright at both relay connectors? Yes → Go To 6 No → Repair the open Fused B(+) Circuit(s). Perform the Powertrain Verification Test - Ver 2	All

*CHECKING RADIATOR FAN OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
6	Turn the ignition off. Disconnect the Radiator Fan Motor harness connector. Remove Radiator Fan Relays. Measure the Radiator Fan Relay Output circuit from both Relays to the Radiator Fan Motor harness connector. Is the resistance below 5.0 ohms for both High and Low Speed Relay Output circuits? Yes → Go To 7 No → Repair the open Radiator Fan Relay Output Circuit(s). Perform the Powertrain Verification Test - Ver 2	All
7	If there are no possible causes remaining, replace the Radiator Fan Relay. View repair options. Repair Replace the Radiator Fan Relay. Perform the Powertrain Verification Test - Ver 2	All

Symptom:
*CHECKING THE ENGINE COOLANT TEMPERATURE SENSOR

POSSIBLE CAUSES
ECT WIRING HARNESS INTERMITTENT
ECT SENSOR (OUT OF CALIBRATION)

TEST	ACTION	APPLICABILITY
1	Turn ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Go To 2	All
2	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn Ignition On. With the DRB in sensors, read the ″Eng Coolant Tmp Deg″ value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ″Eng Coolant Tmp Deg″ value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Was the ″Eng Coolant Tmp Deg″ value increase a smooth transition and did it reach at least 180°? Yes → Test Complete. No → Replace the Engine Coolant Temperature Sensor. Perform the Powertrain Verification Test - Ver 5.	All

Symptom:

*CHECKING THE INTAKE AIR TEMPERATURE SENSOR

POSSIBLE CAUSES
IAT SENSOR (OUT OF CALIBRATION)
WIRING HARNESS INTERMITTENT

TEST	ACTION	APPLICABILITY
1	Turn ignition on. **Note: Do not allow more than 5 minutes delay between the next steps.** With the DRB in Sensors, read the ″Intake Air Temp Deg″ value and record the reading. Turn ignition off. Disconnect and remove the IAT Sensor. Using a temp probe, measure the air temperature inside the IAT Sensor opening. Is the recorded IAT temperature value within 10° of the temperature probe reading? Yes → Go To 2 No → Check the IAT wiring for a high resistance condition. If OK, replace the IAT sensor. Perform the Powertrain Verification Test - Ver 5.	All
2	Turn ignition off. **Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Perform a wiggle test on the related wiring harnesses with the engine running. Watch for the Good Trip Counter to change to 0. Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the Powertrain Verification Test - Ver 5. No → Test Complete.	All

Symptom:
*CHECKING THE PCM POWER AND GROUNDS

POSSIBLE CAUSES
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
PCM GROUND CIRCUIT(S) OPEN
FUSED B(+) CIRCUIT LESS THAN 10.0 VOLTS

TEST	ACTION	APPLICABILITY
1	Turn the Ignition Off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect the test light to Ground. Probe the B(+) Circuit in the PCM Connector. Is the test light illuminated and bright? No → Repair the fused B+ circuit for High resistance. If open circuit PCM will show ″NO RESPONSE″ Perform Powertrain Verification Test VER-1A. Yes → Go To 2	All
2	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition key on. Use a 12 volt test light in the following step. With the 12V test light connected to ground, probe the Fused Ignition in the PCM Connector. Is the test light illuminated and bright? Yes → Go To 3 No → Repair the open or high resistance Fused Ignition Switch Output Circuit between PCM & Ignition Switch. Perform the Powertrain Verification Test - Ver 1.	All
3	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect 12V test light to B(+). Probe the Ground Circuits, one at a time, in the PCM Connector. Was the light illuminated and bright in each circuit? Yes → Test Complete. No → Repair the ground(s) for an open or high resistance at the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 1.	All

Symptom:

***CHECKING THROTTLE POSITION SENSOR OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
TPS VOLTAGE CHANGE NOT SMOOTH
TPS CONNECTORS/HARNESS INTERMITTENT (D)
TPS HARNESS/CONNECTORS INTERMITTENT (C)
TPS HARNESS/CONNECTORS OBSERVABLE (E)
TPS VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED

TEST	ACTION	APPLICABILITY
1	Engine Running. **Warning: KEEP CLEAR OF THE ENGINE'S MOVING PARTS.** Wiggle the Throttle Position Sensor Connectors and Harness. Monitor engine RPM. Was there any change in engine RPM when wiggled? Yes → Repair the Harness or Connector that caused the engine RPM to change. Perform Powertrain Verification Test VER-5. No → Go To 2	All
2	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 3 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
3	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Wiggle the Throttle Position Sensor Connectors and Harness. Monitor the DRB display. Was there any change in Throttle Position Sensor voltage when wiggled? Yes → Repair the Harness or Connector that caused the voltage change. Perform Powertrain Verification Test VER-5. No → Go To 4	All
4	Ignition Off Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform Powertrain Verification Test VER-5. No → Go To 5	All

*CHECKING THROTTLE POSITION SENSOR OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
5	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Test Complete. No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All

Symptom:

P0645-A/C CLUTCH RELAY CKT

When Monitored and Set Condition:

P0645-A/C CLUTCH RELAY CKT

When Monitored: With the ignition key in the run position and battery voltage above 10 volts.

Set Condition: An open or shorted condition is detected in the A/C clutch relay control circuit.

POSSIBLE CAUSES
A/C CLUTCH RLY CIRCUIT WIRING HARNESS OBSERVABLE PROBLEM
A/C CLUTCH RLY CIRCUIT WIRING HARNESS INTERMITTENT PROBLEM
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
A/C CLUTCH RELAY CONTROL CIRCUIT OPEN
A/C CLUTCH RELAY CONTROL CIRCUIT SHORT TO GROUND
A/C CLUTCH RELAY
PCM (A/C CLUTCH RELAY)

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running With the DRB, actuate the A/C Clutch Relay. Is the A/C Clutch Relay clicking? Yes → Go To 2 No → Go To 4	All
2	Turn ignition off. Using the schematic as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 2 No → Go To 3	All
3	Ignition On, Engine Not Running. With the DRB, actuate the A/C Clutch Relay. Wiggle the Wiring Harness from the Relay to the PCM. Did the wiggling interrupt the clicking? Yes → Repair as necessary where wiggling caused the clicking to be interrupted. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

P0645-A/C CLUTCH RELAY CKT — Continued

TEST	ACTION	APPLICABILITY
4	Turn Ignition Off. Disconnect the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Turn ignition on. Using a Voltmeter, measure the Fused Ignition Switch Output Circuit voltage at A/C clutch relay. Is the voltage above 10.0 volts? Yes → Go To 5 No → Repair the open Fused Ignition Switch Output Circuit. Perform the Powertrain Verification Test - Ver 2	All
5	Turn Ignition Off. Disconnect the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance between Terminals 1(85) and 2 (86) of the A/C Clutch Relay. Is the resistance between 50.0 and 90.0 ohms? Yes → Go To 6 No → Replace the A/C Clutch Relay. Perform the Powertrain Verification Test - Ver 2	All
6	Turn Ignition Off. Disconnect the PCM Connector. Disconnect the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the A/C Clutch Relay Control Circuit from the Relay connector to the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair open A/C Clutch Relay Control Circuit. Perform the Powertrain Verification Test - Ver 2	All
7	Turn Ignition Off. Disconnect the PCM Connector. Disconnect the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the A/C Clutch Control Circuit resistance at PCM connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the A/C Clutch Relay Control Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 2 No → Go To 8	All
8	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 2	All

Symptom:

P1598-A/C PRESSURE SENSOR VOLTS TOO HIGH

When Monitored and Set Condition:

P1598-A/C PRESSURE SENSOR VOLTS TOO HIGH

When Monitored: With the ignition in, the engine running, and the A/C relay energized.

Set Condition: The A/C pressure sensor signal at the PCM goes above 4.9 volts.

POSSIBLE CAUSES
INTERMITTENT WIRING & CONNECTORS CONDITIONS
A/C PRESSURE SENSOR GROUND CIRCUIT OPEN
A/C PRESSURE SENSOR SIGNAL CIRCUIT OPEN
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO VOLTAGE
A/C PRESSURE SENSOR (VOLTAGE < 1.0 VOLT)
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running. With the DRBIII®, read A/C Pressure Sensor voltage. Is the A/C Pressure Sensor voltage above 4.6 volts? Yes → Go To 2 No → Go To 7	All
2	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the sensor ground circuit from the PCM harness connector to the A/C Pressure Sensor harness connector. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair the open TP Sensor Ground Circuit. Perform the Powertrain Verification Test - Ver 2	All
3	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the A/C Pressure Sensor Signal circuit. Is the voltage above 5.5 volts? Yes → Repair the A/C Pressure Sensor Signal Circuit shorted to voltage. Perform the Powertrain Verification Test - Ver 2 No → Go To 4	All

P1598-A/C PRESSURE SENSOR VOLTS TOO HIGH — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. With the DRBIII®, read the A/C Pressure Sensor voltage. Connect a jumper wire between the A/C Sensor Signal circuit and Sensor Ground circuit. Is the voltage below 1.0 volt? Yes → Replace the A/C Pressure Sensor. Perform the Powertrain Verification Test - Ver 2 No → Go To 5	All
5	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance of the A/C Pressure Signal circuit between the Sensor connector and the PCM connector. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open A/C Pressure Sensor Signal Circuit. Perform the Powertrain Verification Test - Ver 2	All
6	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 2	All
7	The conditions necessary to set this DTC are not present at this time.Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorts and open circuits. Were any problems found? Yes → Repair defective wiring and/or connector as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

Symptom:

P1599-A/C PRESSURE SENSOR VOLTS TOO LOW

When Monitored and Set Condition:

P1599-A/C PRESSURE SENSOR VOLTS TOO LOW

When Monitored: With the ignition on, the engine running, and the A/C relay energized.

Set Condition: The A/C pressure sensor signal voltage at the PCM goes below 0.5 volts, or is below 0.7 volts for 22 seconds when the A/C relay is energized.

POSSIBLE CAUSES
INTERMITTENT WIRING & CONNECTORS CONDITIONS
A/C PRESSURE SENSOR 5-VOLT SUPPLY CIRCUIT OPEN
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO GROUND
A/C PRESSURE SENSOR SIGNAL CIRCUIT SHORTED TO SENSOR GROUND CIRCUIT
A/C PRESSURE SENSOR (VOLTAGE > 1.0 VOLT)
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running. With the DRBIII®, read the A/C Pressure Sensor voltage. Is the A/C Pressure Sensor voltage below 0.2 volt? Yes → Go To 2 No → Go To 7	All
2	Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. With the DRB, read the A/C Pressure Sensor voltage. Is the voltage above 1.0 volt? Yes → Replace the A/C Pressure Sensor. Perform the Powertrain Verification Test - Ver 2 No → Go To 3	All
3	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Turn the ignition on. Measure the voltage of the A/C Signal circuit in the A/C Pressure Sensor connector. Is the voltage below 4.9 volts? Yes → Repair the open 5-Volt Supply Circuit. Perform the Powertrain Verification Test - Ver 2 No → Go To 4	All

P1599-A/C PRESSURE SENSOR VOLTS TOO LOW — Continued

TEST	ACTION	APPLICABILITY
4	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the voltage between A/C Pressure Sensor Signal circuit and ground. Is the resistance below 5.0 ohms? Yes → Repair the A/C Pressure Sensor Signal Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 2 No → Go To 5	All
5	Turn the ignition off. Disconnect the A/C Pressure Sensor harness connector. Disconnect the PCM harness connector. Measure the resistance between the Sensor Signal Circuit and the Sensor Ground Circuit at the PCM connector. Is the resistance below 5.0 ohms? Yes → Repair the Sensor Signal Circuit shorted to Sensor Ground Circuit. Perform the Powertrain Verification Test - Ver 2 No → Go To 6	All
6	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 2	All
7	The conditions necessary to set this DTC are not present at this time.Using the schematics as a guide, inspect the wiring and connectors specific to this circuit. Wiggle the wires while checking for shorts and open circuits. Were any problems found? Yes → Repair defective wiring and/or connector as necessary. Perform the Powertrain Verification Test - Ver 2 No → Test Complete.	All

Symptom:

***CHECKING A/C SYSTEM OPERATION WITH NO DTC'S**

POSSIBLE CAUSES
A/C PRESSURE SENSOR DTC PRESENT
REFRIGERATION SYSTEM NOT PROPERLY CHARGED
A/C CLUTCH RELAY OUTPUT CIRCUIT OPEN
A/C COMPRESSOR CLUTCH GROUND CIRCUIT OPEN
FUSED B(+) CIRCUIT OPEN
A/C CLUTCH COIL
A/C CLUTCH RELAY

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running With the DRBIII read DTC's. Is there an A/C Clutch Relay DTC? Yes → Refer to symptom P0645-A/C CLUTCH RELAY CKT in the HEATING & A/C category. No → Go To 2	All
2	Turn Ignition Off. Verify that the Refrigerant System is properly charged per service procedure. Is the Refrigerant System properly charged? Yes → Go To 3 No → Properly charge the Refrigerant System per the service procedure. Perform the Powertrain Verification Test - Ver 2	All
3	Ignition On, Engine Not Running. With the DRBIII, read DTC's. Is there an A/C Pressure Sensor DTC present? Yes → Repair all A/C Pressure Sensor trouble codes first. Perform the Powertrain Verification Test - Ver 2 No → Go To 4	All
4	Turn Ignition Off. Disconnect the A/C compressor clutch connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the A/C Compressor Clutch Ground Circuit to ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair the open A/C compressor clutch ground circuit. Perform the Powertrain Verification Test - Ver 2	All

*CHECKING A/C SYSTEM OPERATION WITH NO DTC'S — Continued

TEST	ACTION	APPLICABILITY
5	Turn Ignition Off. Disconnect the A/C Clutch Connector. **Note: Check connectors - Clean/repair as necessary.** Remove the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the A/C Clutch Relay Output from the Relay to the A/C Clutch Coil. Is the resistance below 5.0 ohms? Yes → Go To 6 No → Repair the open A/C Clutch Relay Output Circuit. Perform the Powertrain Verification Test - Ver 2	All
6	Turn Ignition Off. Remove the A/C Clutch Relay. **Note: Check connectors - Clean/repair as necessary.** With a Voltmeter, measure the Fused B(+) at the Relay. Is the voltage above 11.0 volts? Yes → Go To 7 No → Repair the open Fused B(+) Circuit. Perform the Powertrain Verification Test - Ver 2	All
7	Turn engine off (ignition on). With the DRB III actuate the A/C clutch relay. With a Voltmeter, measure the A/C Clutch Relay Output at the A/C Clutch. Does the voltage fluctuate between 0.0 and 11.0 volts? Yes → Replace the A/C Clutch Coil. Perform the Powertrain Verification Test - Ver 2 No → Go To 8	All
8	If there are no possible causes remaining, replace the A/C Clutch Relay. View repair options. Repair Replace the A/C Clutch Relay. Perform the Powertrain Verification Test - Ver 2	All

Symptom List:

P1595-SPEED CONTROL SOLENOID CIRCUITS
P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be P1595-SPEED CONTROL SOLENOID CIRCUITS.

When Monitored and Set Condition:

P1595-SPEED CONTROL SOLENOID CIRCUITS

When Monitored: With the ignition key on, the speed control switched on, the SET switch pressed and the vehicle in drive gear moving above 35 MPH.

Set Condition: The powertrain control module actuates the vacuum and vent solenoids but they do not respond.

P1683-SPD CTRL PWR RELAY; OR S/C 12V DRIVER CKT

When Monitored: With the ignition key on and the speed control switched on.

Set Condition: The speed control power supply circuit is either open or shorted to ground.

POSSIBLE CAUSES
GROUND CIRCUIT AT S/C SERVO CONNECTOR OPEN
S/C WIRING HARNESS INTERMITTENT PROBLEM (S/C VAC SOL AC)
S/C VACUUM SOLENOID CONTROL CIRCUIT OPEN
S/C VACUUM SOLENOID CONTROL CKT SHORT TO GROUND
S/C VENT SOLENOID CONTROL CIRCUIT OPEN
S/C VENT SOLENOID CONTROL CKT SHORT TO GROUND
S/C WIRING HARNESS INTERMITTENT PROBLEM (S/C VENT SOL AC)
S/C WIRING HARNESS OBSERVABLE PROBLEM
S/C POWER SUPPLY CIRCUIT OPEN
S/C POWER SUPPLY CIRCUIT SHORTED TO GROUND
S/C SERVO (12V DRIVER CIRCUIT)
S/C SERVO (12V DRIVER CIRCUIT)
BRAKE SWITCH
BRAKE SWITCH OUT OF ADJUSTMENT
S/C BRAKE SWITCH OUTPUT CIRCUIT OPEN
S/C BRAKE SWITCH OUTPUT CIRCUIT SHORTED TO GROUND
PCM DEFECTIVE

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

POSSIBLE CAUSES
PCM DEFECTIVE (12V DRIVER CIRCUIT)
PCM DEFEFECTIVE

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running. With the DRB actuate the S/C Vent Solenoid. Does the Speed Control Servo click? Yes → Go To 2 No → Go To 13	SPEED CONTROL
2	Ignition On, Engine Not Running. With the DRB, actuate the S/C Vacuum Solenoid. Does the Speed Control Servo click? Yes → Go To 3 No → Go To 6	SPEED CONTROL
3	Turn ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 4 No → Go To 4	SPEED CONTROL
4	Ignition On, Engine Not Running. With the DRB actuate the S/C Vent Solenoid. Wiggle the Wiring Harness from S/C Servo and Brake Switch to Powertrain Control Module. Did the wiggling interrupt the S/C Servo actuation? Yes → Repair as necessary where wiggling caused the actuation to be interrupted. Perform the Powertrain Verification Test - Ver 4 No → Go To 5	SPEED CONTROL
5	Ignition On, Engine Not Running. With the DRB actuate the S/C Vacuum Solenoid. Wiggle the Wiring Harness from S/C Servo and Brake Switch to Powertrain Control Module. Did the wiggling interrupt the S/C actuation? Yes → Repair as necessary where wiggling caused the actuation to be interrupted. Perform the Powertrain Verification Test - Ver 4 No → Test Complete.	SPEED CONTROL

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
6	Ignition On, Engine Not Running. With the DRB actuate the S/C Vent Solenoid. Wiggle the Wiring Harness from S/C Servo and Brake Switch to Powertrain Control Module. Did the wiggling interrupt the S/C Servo actuation? Yes → Repair as necessary where wiggling caused the actuation to be interrupted. Perform the Powertrain Verification Test - Ver 4 No → Go To 7	SPEED CONTROL
7	Turn ignition off. Disconnect the Speed Control Servo 4-Way Connector. **Note: Check connectors - Clean/repair as necessary.** **Note: Ensure the Brake Pedal is not depressed during the following steps.** Key on, Engine off. Turn S/C Switch on. With the DRB, actuate the S/C Vacuum Solenoid. Using a 12-Volt Test Light, check the S/C Brake Switch Output Circuit at the Servo connector. Is the light illuminated and bright? Yes → Go To 8 No → Go To 19	SPEED CONTROL
8	Turn ignition off. Disconnect the Speed Control Servo Connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Ground Circuit at the Servo Connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Repair open Ground Circuit at S/C Servo Connector. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
9	Turn ignition off. Disconnect the Speed Control Servo Connector. Disconnect Powertrain Control Module Connectors. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the resistance of the S/C Vacuum Solenoid Control Circuit from the PCM to the Servo Connector. Is the resistance below 5.0 ohms? Yes → Go To 10 No → Repair the open S/C Vacuum Solenoid Control Circuit. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
10	Turn ignition off. Disconnect the Speed Control Servo Connector. Disconnect Powertrain Control Module Connectors. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the resistance of the S/C Vacuum Solenoid Control Circuit from the Servo Connector to a good ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the S/C Vacuum Solenoid Control Circuit. Perform the Powertrain Verification Test - Ver 4 No → Go To 11	SPEED CONTROL
11	Turn ignition off. Disconnect the S/C Servo. Using the DRB, actuate the S/C Vacuum solenoid. Using a 12 Volt Test Light connected to B(+), probe the S/C Vacuum Solenoid Control Circuit. Does the test light blink on and off? Yes → Replace the S/C Servo. Perform the Powertrain Verification Test - Ver 4 No → Go To 12	SPEED CONTROL
12	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
13	Turn ignition off. Disconnect the Speed Control Servo 4-Way Connector. **Note: Check connectors - Clean/repair as necessary.** **Note: Ensure the Brake Pedal is not depressed during the following steps.** Key on, Engine off. Turn S/C Switch on. With the DRB, actuate the S/C Vacuum Solenoid. Using a 12-Volt Test Light, check the S/C Brake Switch Output Circuit at the Servo connector. Is the light illuminated and bright? Yes → Go To 14 No → Go To 19	SPEED CONTROL
14	Turn ignition off. Disconnect the Speed Control Servo Connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Ground Circuit at the Servo Connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 15 No → Repair open Ground Circuit at S/C Servo Connector. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
15	Turn ignition off. Disconnect the Speed Control Servo Connector. Disconnect Powertrain Control Module Connectors. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the resistance of the S/C Vent Solenoid Control Circuit from the PCM to the Servo Connector. Is the resistance below 5.0 ohms? Yes → Go To 16 No → Repair the open S/C Vent Solenoid Control Circuit. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
16	Turn ignition off. Disconnect the S/C Servo Connector. Disconnect Powertrain Control Module Connectors. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the resistance of the S/C Vent Solenoid Control Circuit from the Servo Connector to a good Ground. Is the resistance below 5.0 ohms? Yes → Repair the short to ground in the S/C Vent Solenoid Control Circuit. Perform the Powertrain Verification Test - Ver 4 No → Go To 17	SPEED CONTROL
17	Turn ignition off. Disconnect the S/C Servo. Using the DRB, actuate the S/C Vent solenoid. Using a 12 Volt Test Light connected to B(+), probe the S/C Vent Solenoid Control Circuit. Does the test light blink on and off? Yes → Replace the S/C Servo. Perform the Powertrain Verification Test - Ver 4 No → Go To 18	SPEED CONTROL
18	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
19	Turn ignition off. Using Service Procedure, check Brake Switch adjustment. Was Brake Switch adjustment OK? Yes → Go To 20 No → Adjust Brake Switch. Perform the Powertrain Verification Test - Ver 4	All

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
20	Turn ignition off. Disconnect the Brake Switch Connector. **Note: Check connectors - Clean/repair as necessary.** Be sure the brake pedal is not depressed during the next step. Using an ohmmeter, measure the resistance between the S/C power supply circuit and the S/C brake switch output circuit (measurement taken across switch). Is the resistance below 5.0 ohms? Yes → Go To 21 No → Replace the Brake Switch. Perform the Powertrain Verification Test - Ver 4	All
21	Turn ignition off. Disconnect the Brake Switch connector. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance between the S/C Power Supply Circuit and ground at the Brake Switch connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Power Supply Circuit shorted to ground. Perform the Powertrain Verification Test - Ver 4 No → Go To 22	All
22	Turn ignition off. Disconnect the Brake Switch Connector. Disconnect the Powertrain Control Module **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the S/C Power Supply Circuit from the PCM to the Brake Switch Connector. Is the resistance below 5.0 ohms? Yes → Go To 23 No → Repair the open S/C Power Supply Circuit. Perform the Powertrain Verification Test - Ver 4	All
23	Turn ignition off. Disconnect the Speed Control Servo 4-Way Connector. Disconnect the brake switch connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the S/C Brake Switch Output circuit from Servo Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair Switched S/C Brake Switch Output circuit shorted to ground. Perform the Powertrain Verification Test - Ver 4 No → Go To 24	SPEED CONTROL

P1595-SPEED CONTROL SOLENOID CIRCUITS — Continued

TEST	ACTION	APPLICABILITY
24	Turn ignition off. Disconnect the S/C Servo Connector. Disconnect the Brake Switch Connector. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure the resistance of the S/C Brake Switch Output Circuit from the Brake Switch Connector to the Servo Connector. Is the resistance above 5.0 ohms? Yes → Repair the open S/C Brake Switch Output Circuit. Perform the Powertrain Verification Test - Ver 4 No → Go To 25	SPEED CONTROL
25	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL

Symptom:

P1597-SPEED CONTROL SWITCH ALWAYS LOW

When Monitored and Set Condition:

P1597-SPEED CONTROL SWITCH ALWAYS LOW

When Monitored: With the ignition key on and battery voltage above 10.4 volts.

Set Condition: When switch voltage is less than 0.39 volts for 2 minutes.

POSSIBLE CAUSES
CLOCKSPRING SHORTED TO GROUND
S/C WIRING HARNESS OBSERVABLE PROBLEM
S/C SWITCH (ON/OFF)
S/C SWITCH (RESUME/ACCEL)
S/C SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
S/C SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
SPEED CONTROL ON/OFF SWITCH STUCK
SPEED CONTROL RESUME/ACCEL SWITCH STUCK
PCM

TEST	ACTION	APPLICABILITY
1	Ignition On, Engine Not Running With DRB, read the S/C Switch volts in Sensors. Is the S/C Switch voltage below 1.0 volt? Yes → Go To 2 No → Go To 8	SPEED CONTROL
2	Turn ignition off. Disconnect the S/C ON/OFF Switch. **Note: Check connectors - Clean/repair as necessary.** Turn ignition on, with engine not running. With the DRB, read the S/C Switch volts in Sensors. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the S/C ON/OFF Switch. Perform the Powertrain Verification Test - Ver 4 No → Go To 3	SPEED CONTROL

P1597-SPEED CONTROL SWITCH ALWAYS LOW — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the S/C RESUME/ACCEL Switch. **Note: Check connectors - Clean/repair as necessary.** Turn ignition on, with engine not running. With the DRB, read the S/C Switch volts in Sensors. Did the S/C Switch volts go above 4.0 volts? Yes → Replace the Resume/Accel Switch. Perform the Powertrain Verification Test - Ver 4 No → Go To 4	SPEED CONTROL
4	Disconnect the clockspring connector (instrument panel wiring side). Turn ignition on, with engine not running. With the DRB, read the S/C Switch volts in Sensors. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the Clockspring. Perform the Powertrain Verification Test - Ver 4 No → Go To 5	SPEED CONTROL
5	Turn ignition off. Disconnect the S/C ON/OFF Switch. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance between the S/C Signal Circuit and the Sensor Ground Circuit at the ON/OFF switch connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Signal Circuit shorted to Sensor Ground. Perform the Powertrain Verification Test - Ver 4 No → Go To 6	SPEED CONTROL
6	Turn ignition off. Disconnect the S/C ON/OFF Switch. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure resistance of S/C Switch Signal Circuit to ground at the PCM Connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Switch Signal Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 4 No → Go To 7	SPEED CONTROL
7	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
8	Turn ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 4 No → Go To 9	SPEED CONTROL

P1597-SPEED CONTROL SWITCH ALWAYS LOW — Continued

TEST	ACTION	APPLICABILITY
9	Disconnect the Speed Control On/Off Switch. With the DRB, read the Speed Control Switch Voltage. Did the DRB show Speed Control Switch Voltage go from below 4.0 Volts to above 4.0 Volts? Yes → Replace the Left Speed Control Switch. Perform the Powertrain Verification Test - Ver 4 No → Go To 10	SPEED CONTROL
10	Disconnect the Speed Control Resume/Accel Switch. With the DRB, read the Speed Control Switch Voltage. Did the DRB show Speed Control Switch Voltage go from below 4.0 Volts to above 4.0 Volts? Yes → Replace the Right Speed Control Switch. Perform the Powertrain Verification Test - Ver 4 No → Test Complete.	SPEED CONTROL

Symptom:

***CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT**

POSSIBLE CAUSES
GROUND CIRCUIT AT S/C SERVO CONNECTOR OPEN
GROUND CIRCUIT TO S/C RESUME/ACCEL SWITCH CONNECTOR OPEN
S/C SW SIGNAL CKT TO CLOCKSPRING CONN OPEN
SPEED CONTROL SWITCH GROUND CIRCUIT OPEN CLOCKSPRING TO S/C SWITCH
SPEED CONTROL SWITCH GROUND CIRCUIT OPEN PCM TO CLOCKSPRING
CLOCKSPRING SHORTED TO GROUND
DRB DOES NOT SHOW SET SWITCH ″PRESSED″ OR RELEASED
S/C WIRING HARNESS OBSERVABLE PROBLEM
CANCEL SWITCH
COAST SWITCH
THROTTLE CABLE OBSERVABLE PROBLEM
THROTTLE OPENS AND CLOSES
S/C SWITCH (ON/OFF)
S/C SWITCH (RESUME/ACCEL)
S/C SIGNAL CIRCUIT SHORTED TO SENSOR GROUND
S/C SWITCH SIGNAL CIRCUIT SHORTED TO GROUND
SPEED CONTROL ON/OFF SWITCH
SPEED CONTROL ON/OFF SWITCH STUCK
SPEED CONTROL RESUME/ACCEL SWITCH
SPEED CONTROL RESUME/ACCEL SWITCH STUCK
SPEED CONTROL SW SIG CKT OPEN PCM TO CLOCK SPRING
SPEED CONTROL SW SIG CKT OPEN CLOCKSPRING TO S/C SWITCH
SPEED CONTROL SWITCH SIGNAL CKT SHORTED TO VOLTAGE
PCM
POWERTRAIN CONTROL MODULE

TEST	ACTION	APPLICABILITY
1	Ignition on, with engine not running. With the DRB, monitor the Speed Control Switch inputs. While observing the display, press the Brake Pedal several times. Does the DRB show Brake Switch ″pressed″ and ″released″? Yes → Go To 2 No → Refer to symptom *BRAKE SWITCH SENSE STATUS DOES NOT CHANGE ON DRB in the SPEED CONTROL category.	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
2	Turn ignition off. Using the Schematics as a guide, inspect the Wiring and Connectors. Were any problems found? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 4 No → Go To 3	SPEED CONTROL
3	Ignition on, with engine running. With the DRB, monitor the Speed Control Switch inputs. While observing the display, press the On/Off Switch several times. Does the DRB show On/Off Switch ″pressed″ and ″released″? Yes → Go To 4 No → Go To 16	SPEED CONTROL
4	Turn ignition off. Disconnect the Speed Control Servo Connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Ground Circuit at the Servo Connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 5 No → Repair open Ground Circuit at S/C Servo Connector. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
5	Ignition on, with engine not running. With the DRB, monitor the P/N Switch inputs. While observing the display, move the Gear Selector to DRIVE. Does the DRB show P/N switch ″D/R″? Yes → Go To 6 No → Refer to symptom *CHECKING PARK/NETURAL SWITCH OPERATION in the TRANSMISSION category.	SPEED CONTROL
6	Inspect the throttle cable and linkage for any binding or damage. Is the cable or linkage disconnected or damaged? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 4 No → Go To 7	SPEED CONTROL
7	Ignition on, with engine running. With the DRB, monitor the Speed Control Switch inputs. While observing the display, press the Set Switch several times. Does the DRBIII show the Set Switch status change appropriately from Pressed to Released? Yes → Go To 8 No → Replace the Left S/C Switch. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
8	Ignition On, Engine Running. With the DRB, monitor the Speed Control Switch inputs. While observing the display, press the Resume Switch several times. Does the DRBIII show the Resume Switch status change appropriately from Pressed to Released? Yes → Go To 9 No → Go To 12	SPEED CONTROL
9	Ignition on, with engine not running. With the DRB III read DTC's. Are any Vehicle Speed Signal codes set? Yes → Refer to symptom P0500-NO VEHICLE SPEED SIGNAL in the DRIVEABILITY category. No → Go To 10	SPEED CONTROL
10	Ignition On, Engine Running. With the DRB, monitor the Speed Control Switch inputs. While observing the display, press the Cancel Switch several times. Does the DRBIII show the Cancel Switch status change appropriately from Pressed to Released? Yes → Go To 11 No → Replace the Right S/C Switch. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
11	Ignition On, Engine Running. With the DRB, monitor the Speed Control Switch inputs. While observing the display, press the Coast Switch several times. Does the DRBIII show the Coast Switch status change appropriately from Pressed to Released? Yes → Go To 41 No → Replace the Right S/C Switch. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
12	Ignition on, with engine not running. With the DRB III read DTC's. Are any Vehicle Speed Signal codes set? Yes → Refer to symptom P0500-NO VEHICLE SPEED SIGNAL in the DRIVEABILITY category. No → Go To 13	SPEED CONTROL
13	Turn ignition off. Disconnect the Speed Control Resume/Accel Switch. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Sensor Ground Circuit from the S/C Resume/Accel Connector to a good Ground. Is the resistance below 5.0 ohms? Yes → Go To 14 No → Repair the open sensor ground circuit, right S/C switch connector to the clockspring connector. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
14	Turn ignition off. Disconnect both Speed Control Switches. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Speed Control Switch Signal Circuit and Sensor Ground Circuit from the On/Off Switch connector to the Resume/Accel connector. Is resistance below 5.0 ohms for both circuits? Yes → Go To 15 No → Replace the Clockspring. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
15	Turn ignition off. Disconnect the Speed Control Resume/Accel Switch. **Note: Check connectors - Clean/repair as necessary.** Connect a Jumper between the S/C Switch Signal and Sensor Ground at the switch connector. Ignition On, Engine Not Running. With the DRB, read the S/C Switch voltage. Does the DRB show S/C Switch is less than 1.0 volt? Yes → Replace the right Speed Control Switch. Perform the Powertrain Verification Test - Ver 4 No → Go To 41	SPEED CONTROL
16	Turn ignition off. Disconnect the Speed Control Servo Connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Ground Circuit at the Servo Connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 17 No → Repair open Ground Circuit at S/C Servo Connector. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
17	Inspect the throttle cable and linkage for any binding or damage. Is the cable or linkage disconnected or damaged? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 4 No → Go To 18	SPEED CONTROL
18	Ignition On, Engine Running. With the DRB, read the Speed Control Switch voltage. Does the DRB show Speed Control Switch voltage above 4.0 volts? Yes → Go To 19 No → Go To 29	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
19	Ignition on, with engine not running. With the DRB, monitor the P/N Switch inputs. While observing the display, move the Gear Selector to DRIVE. Does the DRB show P/N switch ″D/R″? Yes → Go To 20 No → Refer to symptom *CHECKING PARK/NETURAL SWITCH OPERATION in the TRANSMISSION category.	SPEED CONTROL
20	Turn ignition off. Disconnect both Speed Control Switches. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the Speed Control Switch Signal Circuit and Sensor Ground Circuit from the On/Off Switch connector to the Resume/Accel connector. Is resistance below 5.0 ohms for both circuits? Yes → Go To 21 No → Replace the Clockspring. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
21	Turn ignition off. Disconnect the Speed Control On/Off Switch 2-Way Connector. Disconnect the clockspring connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the S/C Switch Sensor Ground Circuit from the On/Off Switch 2-Way Connector to the clockspring connector. Is the resistance below 5.0 ohms? Yes → Go To 22 No → Replace the Clockspring. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
22	Turn ignition off. Disconnect the clockspring connector (instrument panel harness side). Disconnect the PCM. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the S/C Switch Sensor Ground Circuit from the PCM to the clockspring connector. Is the resistance below 5.0 ohms? Yes → Go To 23 No → Repair open ground circuit from PCM to clockspring. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
23	Turn ignition off. Disconnect the Speed Control On/Off Switch 2-Way Connector only. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance across the S/C On/Off Switch then press and release the On/Off button. Did the resistance go from below 5.0 ohms when pressed to an open circuit when released? Yes → Go To 24 No → Replace the On/Off Switch. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
24	Ignition on, with engine not running. With the DRB III read DTC's. Are any Vehicle Speed Signal codes set? Yes → Refer to symptom P0500-NO VEHICLE SPEED SIGNAL in the DRIVEABILITY category. No → Go To 25	SPEED CONTROL
25	Turn ignition off. Disconnect the Speed Control On/Off Switch 2-Way Connector only. **Note: Check connectors - Clean/repair as necessary.** Turn ignition on. Using a voltmeter, measure the S/C Switch Signal Circuit for voltage at the On/Off Switch 2-Way Connector. Is the voltage above 6.0 volts? Yes → Repair the Speed Control Switch Signal Circuit for a short to voltage. Perform the Powertrain Verification Test - Ver 4 No → Go To 26	SPEED CONTROL
26	Turn ignition off. Disconnect the Clockspring connector (instrument panel harness side). Disconnect the PCM. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the S/C Switch Signal Circuit from the PCM to the Clockspring Connector. Is the resistance below 5.0 ohms? Yes → Go To 27 No → Repair open Speed Control Switch Signal Circuit PCM to Clockspring. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
27	Turn ignition off. Disconnect the Clockspring Connector. Disconnect the On/Off switch 2-way connector. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance of the S/C Switch Signal Circuit from the clockspring to the On/Off switch connector. Is the resistance below 5.0 ohms? Yes → Go To 28 No → Replace the Clockspring. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
28	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace Powertrain Control Module. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
29	Ignition on, with engine not running. With the DRB, monitor the P/N Switch inputs. While observing the display, move the Gear Selector to DRIVE. Does the DRB show P/N switch ″D/R″? Yes → Go To 30 No → Refer to symptom *CHECKING PARK/NETURAL SWITCH OPERATION in the TRANSMISSION category.	SPEED CONTROL
30	Ignition On, Engine Not Running With DRB, read the S/C Switch volts in Sensors. Is the S/C Switch voltage below 1.0 volt? Yes → Go To 31 No → Go To 38	SPEED CONTROL
31	Ignition on, with engine not running. With the DRB III read DTC's. Are any Vehicle Speed Signal codes set? Yes → Refer to symptom P0500-NO VEHICLE SPEED SIGNAL in the DRIVEABILITY category. No → Go To 32	SPEED CONTROL
32	Turn ignition off. Disconnect the S/C ON/OFF Switch. **Note: Check connectors - Clean/repair as necessary.** Turn ignition on, with engine not running. With the DRB, read the S/C Switch volts in Sensors. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the S/C ON/OFF Switch. Perform the Powertrain Verification Test - Ver 4 No → Go To 33	SPEED CONTROL
33	Turn ignition off. Disconnect the S/C RESUME/ACCEL Switch. **Note: Check connectors - Clean/repair as necessary.** Turn ignition on, with engine not running. With the DRB, read the S/C Switch volts in Sensors. Did the S/C Switch volts go above 4.0 volts? Yes → Replace the Resume/Accel Switch. Perform the Powertrain Verification Test - Ver 4 No → Go To 34	SPEED CONTROL
34	Disconnect the clockspring connector (instrument panel wiring side). Turn ignition on, with engine not running. With the DRB, read the S/C Switch volts in Sensors. Did the S/C Switch volts change to 5.0 volts? Yes → Replace the Clockspring. Perform the Powertrain Verification Test - Ver 4 No → Go To 35	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
35	Turn ignition off. Disconnect the S/C ON/OFF Switch. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** Using an Ohmmeter, measure the resistance between the S/C Signal Circuit and the Sensor Ground Circuit at the ON/OFF switch connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Signal Circuit shorted to Sensor Ground. Perform the Powertrain Verification Test - Ver 4 No → Go To 36	SPEED CONTROL
36	Turn ignition off. Disconnect the S/C ON/OFF Switch. Disconnect the Powertrain Control Module. **Note: Check connectors - Clean/repair as necessary.** With an Ohmmeter, measure resistance of S/C Switch Signal Circuit to ground at the PCM Connector. Is the resistance below 5.0 ohms? Yes → Repair S/C Switch Signal Circuit for a short to ground. Perform the Powertrain Verification Test - Ver 4 No → Go To 37	SPEED CONTROL
37	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
38	Ignition on, with engine not running. With the DRB III read DTC's. Are any Vehicle Speed Signal codes set? Yes → Refer to symptom P0500-NO VEHICLE SPEED SIGNAL in the DRIVEABILITY category. No → Go To 39	SPEED CONTROL
39	Disconnect the Speed Control On/Off Switch. With the DRB, read the Speed Control Switch Voltage. Did the DRB show Speed Control Switch Voltage go from below 4.0 Volts to above 4.0 Volts? Yes → Replace the Left Speed Control Switch. Perform the Powertrain Verification Test - Ver 4 No → Go To 40	SPEED CONTROL
40	Disconnect the Speed Control Resume/Accel Switch. With the DRB, read the Speed Control Switch Voltage. Did the DRB show Speed Control Switch Voltage go from below 4.0 Volts to above 4.0 Volts? Yes → Replace the Right Speed Control Switch. Perform the Powertrain Verification Test - Ver 4 No → Go To 41	SPEED CONTROL

*CHECKING SPEED CONTROL OPERATION WITH NO DTC'S PRESENT — Continued

TEST	ACTION	APPLICABILITY
41	Start Engine. Allow engine to idle for 1 minute. Turn engine off, then ignition on, engine not running. With the DRB, actuate the Speed Control Servo Solenoids. Does the Throttle open and close? Yes → Go To 42 No → Perform Speed Control Vacuum Supply Test per appropriate service procedure. Perform the Powertrain Verification Test - Ver 4	SPEED CONTROL
42	At this time the Speed Control Switch and Servo functions appear to operate properly. Using the DRB, monitor the Speed Control OUTPUT status. Road test the Vehicle at speeds over 35 MPH (55kmh) and attempt to set the Speed Control. The following items will not allow the Speed Control to set. The last or most recent cause for Speed Control not to set is indicated by the DENIED status. If ON/OFF Denied message is indicated, the Powertrain Control Module does not see an ON signal from the Switch. If SPEED Denied message is indicated, the Vehicle Speed as seen by the Powertrain Control Module is not greater than 36 MPH. If RPM Denied message is indicated, the Engine RPM is excessively high. If BRAKE Denied message is indicated, the Brake Switch Sense Circuit is open indicating to the PCM that the Brakes are applied. The Sense Circuit is grounded through the Brake Pedal Switch when the brakes are released. If P/N Denied message is indicated, Park/Neutral Switch Sense Circuit is grounded indicating to PCM that Transmission is not in gear. The Sense Circuit is grounded through the P/N Switch when Transmission is in Park or Neutral. If RPM/SPD Denied message is indicated, the PCM senses excessive Engine RPM for a given Vehicle speed. If SOL FLT Denied message is indicated, the Powertrain Control Module senses a Servo Solenoid Circuit trouble code that is maturing or set in memory. Continue if the previous instructions have been completed. Repair Test Complete.	SPEED CONTROL

Symptom:

***ENGINE CRANKS DOES NOT START**

POSSIBLE CAUSES
FUEL FILTER/PRESSURE REGULATOR (HIGH)
FUEL FILTER/PRESSURE REGULATOR DEFECTIVE (HIGH)
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
FUEL SYSTEM DISABLED BY VTSS/SKIM
POWERTRAIN FUSES OPEN
SECONDARY INDICATORS PRESENT
ENGINE MECHANICAL PROBLEM
HIGH RESISTANCE IN THE FUEL PUMP RELAY OUTPUT CIRCUIT
FUEL PUMP RELAY OUTPUT CIRCUIT OPEN
FUSED B+ CIRCUIT TO FUEL PUMP RELAY OPEN/HIGH RESISTANCE
OPEN/HIGH RESISTANCE IN THE FUEL PUMP GROUND CIRCUIT
FUEL PUMP INLET STRAINER PLUGGED
HIGH RESISTANCE IN THE FUEL PUMP GROUND CIRCUIT
FUEL PUMP MODULE
FUEL PUMP RELAY
KINKED/RESTRICTED FUEL SUPPLY LINE
FUEL PUMP MODULE JUMPER HARNESS DEFECTIVE
NO CKP SENSOR SIGNAL WHEN CRANKING ENGINE
FUEL PUMP MODULE
NO CMP SENSOR SIGNAL WHEN CRANKING ENGINE
CKP & CMP SENSORS OUT OF SYNC

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
1	**Note: The following list of items should be checked before continuing with any no start tests.** The battery must be fully charged and in good condition. A defective battery may produce invalid test results. If the battery is low, charge the battery and then attempt to start the vehicle by cranking the engine for 15 seconds, 3 consecutive times. Make sure the PCM communicates with the DRBIII® and that there are no DTC's stored in the PCM memory. If the PCM reports a ″No Response″ condition, refer to the Communication category for proper tests. Make sure that the PCI bus is functional on the vehicle. Attempt to communicate with the BCM. If the DRB reports a PCI bus problem, refer to the Communication category of symptoms for proper tests. If the vehicle is equipped with a Sentry Key Immobilizer System (SKIS), check for proper communication with the DRBIII® and any DTC's that may be stored in the Sentry Key Immobilizer Module (SKIM). Continue with other tests. Repair Go To 2	All
2	Check for any open fuses in the PDC or Junction Block that may be related to the No Start condition. Are any of the fuses open? Yes → Replace the open fuse and check the related circuit(s) for a short to ground. Perform the Powertrain Verification Test - Ver 1. No → Go To 3	All
3	Turn the ignition on. With the DRB, under DTC's & Related Functions, read the Secondary Indicators while cranking the engine. Are there any Secondary Indicators present while cranking the engine? Yes → Refer to symptom list and perform tests related to the secondary indicator that is reported by the DRB. Perform the Powertrain Verification Test - Ver 1. No → Go To 4	All
4	Turn the ignition on. With the DRB in Inputs/Outputs, read the ″Veh Theft Security″ status. Does the ″Veh Theft Security″ status read ″Fuel On″? Yes → Go To 5 No → Refer to the Symptom list for problems related to Vehicle Theft/ Security. Make sure the PCI Bus is functional and that the SKIM is communicating on the PCI Bus.	All
5	With the DRB in Inputs/Outputs, read the Current CKP State while cranking the engine. Does the DRB display Current CKP State ″Present″ while cranking the engine? Yes → Go To 6 No → Refer to Driveability Symptom P0320-NO CRANK REFERENCE SIGNAL AT PCM. Perform the Powertrain Verification Test - Ver 5	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
6	With the DRB in Inputs/Outputs, read the Current CMP State while cranking the engine. Does the DRB display Current CMP State ″Present″ while cranking the engine? Yes → Go To 7 No → Refer to Driveability Symptom P0340-NO CAM SIGNAL AT PCM Perform the Powertrain Verification Test - Ver 5	All
7	Check for any of the following conditions/mechanical problems. ENGINE VALVE TIMING - must be within specifications ENGINE COMPRESSION - must be within specifications ENGINE EXHAUST SYSTEM - must be free of any restrictions or leaks. FUEL - must be free of contamination FUEL INJECTOR - plugged or restricted injector; control wire not connected to correct injector Are there any engine mechanical problems? Yes → Repair as necessary. Perform the Powertrain Verification Test - Ver 2. No → Go To 8	All
8	Turn the ignition on. With the DRB in Inputs/Outputs, check the ″Current Sync State″ while cranking the engine. Does the DRB show Current Sync State ″Out of Sync″ while cranking the engine? Yes → Check for the CKP Sensor Signal ckt shorted to the CMP Sensor Signal ckt OR Check for valve timing out of specs. Perform the Powertrain Verification Test - Ver 5 No → Go To 9	All
9	Turn ignition on. With the DRB, actuate the ASD Fuel System test. **Note: It may be necessary to use a mechanics stethoscope in the next step.** Listen for fuel pump operation at the fuel tank. Can the fuel pump operation be heard? Yes → Go To 10 No → Go To 18 **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
10	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Remove the pressure test port cap at the fuel rail test port. Connect a fuel pressure gauge to the test port pressure fitting on the fuel rail. Ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 406 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 14 Within Specification Go To 11 Above Specification Replace the fuel filter/pressure regulator. **Caution: Stop All Actuations.**	All
11	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** **Note: 2.7L engines require the use of Miller Tool #6539 (adapter) installed in-line to the fuel supply line. Disconnect the fuel supply line at the fuel rail connection, install tool #6539, then connect a fuel pressure gauge to tool #6539.** **Note: 3.2L/3.5L engines have a pressure test port on the fuel rail. Remove the pressure test port cap at the fuel rail test port. Connect a fuel pressure gauge to the test port pressure fitting on the fuel rail.** Ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 406 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 12 Within Specification Go To 17 Above Specification Replace the fuel filter/pressure regulator. **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
12	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Turn ignition on. With the DRB, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, check the fuel pump relay output circuit (A141) at connector C308. Does the test light illuminate brightly? Yes → Go To 13 No → Repair the high resistance in the fuel pump relay ouput circuit. Check wire from PDC to fuel pump module connector. Also check for bad relay. Perform Powertrain Verification Test VER-1A. **Caution: Stop All Actuations.**	All
13	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to B+, check the fuel pump ground circuit (Z1) at connector C308. Does the test light illuminate brightly? Yes → Go To 14 No → Repair the high resistance in the fuel pump ground circuit. Perform Powertrain Verification Test VER-1 **Note: Re-connect connector C308 before performing the next test.**	All
14	Visually inspect the fuel supply line from the fuel tank to the fuel rail. Look for any signs of physical damage that may restrict the supply line. Were any problems found with the fuel supply line? Yes → Repair/replace fuel supply line as necessary. No → Go To 15	All
15	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. No → Go To 16	All
16	If there are no possible causes remaining, replace the Fuel Pump Module. View repair options. Repair Replace the Fuel Pump Module.	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
17	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** With the DRB, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Test Complete. No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. **Caution: Stop All Actuations.**	All
18	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to B+, check the fuel pump ground circuit (Z1) at connector C308. Does the test light illuminate brightly? Yes → Go To 19 No → Repair the open/high resistance in the fuel pump ground circuit. Perform Powertrain Verification Test VER-1	All
19	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Turn ignition on. With the DRB, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, check the fuel pump relay output circuit (A141) at connector C308. Does the test light illuminate brightly? Yes → Go To 20 No → Go To 22 **Caution: Stop All Actuations.**	All

*ENGINE CRANKS DOES NOT START — Continued

TEST	ACTION	APPLICABILITY
20	Turn the ignition off. Remove the fuel tank using the removal and installation procedure. Inspect the wiring harness that leads from under the rear seat to the Fuel Pump Module. Look for any signs of chafing/mis-routing. Use an ohmmeter to check the continuity of the wiring between the Fuel Pump Module connector and connector C308. Is the harness free from defects? Yes → Go To 21 No → Repair/replace harness as necessary. Perform Powertrain Verification Test VER-1A.	All
21	If there are no possible causes remaining, replace the Fuel Pump Module. View repair options. Repair Replace the Fuel Pump Module. Perform Powertrain Verification Test VER-1A.	All
22	Turn ignition off. Remove the fuel pump relay from the PDC. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using an ohmmeter, measure the fuel pump relay output circuit (A141) from the relay connector to the connector C308. Is the resistance below 5.0 ohms? Yes → Go To 23 No → Repair the open fuel pump relay output circuit. Perform Powertrain Verification Test VER-1	All
23	Turn ignition off. Remove the fuel pump relay from the PDC. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** With a 12 volt test light connected to ground, check the fuel pump relay fused B+ circuit. Is the voltage above 10.0 volts? Yes → Go To 24 No → Repair the open/high resistance in the fused B+ circuit. NOTE: Check for open fuse in the PDC. Perform Powertrain Verification Test VER-1	All
24	If there are no possible causes remaining, replace the Fuel Pump Relay. View repair options. Repair Replace the fuel pump relay. Perform Powertrain Verification Test VER-1	All

Symptom:
*NO CRANK CONDITION

POSSIBLE CAUSES
STARTER RELAY OUTPUT CIRCUIT OPEN
STARTER RELAY
BATTERY CIRCUIT RESISTANCE TOO HIGH
STARTER
REPAIR MECHANICAL CONDITION
FUSED B(+) CIRCUIT OPEN
IGNITION SWITCH OUTPUT CIRCUIT OPEN
STARTER RELAY CONTROL CIRCUIT OPEN
PCM DEFECTIVE-STARTER RELAY CONTROL CIRCUIT

TEST	ACTION	APPLICABILITY
1	Turn ignition off. Disconnect the Starter Relay. Disconnect the Starter Relay Output Wire from the Starter Solenoid. Using an ohmmeter, measure the resistance of the Starter Relay Output Circuit from the Relay to the Solenoid Connector. Is the resistance below 5.0 ohms? Yes → Go To 2 No → Repair open Starter Relay Output Ckt. Perform the Powertrain Verification Test - Ver 1.	All
2	Turn the ignition on. With the DRB III, monitor the Park/Neutral Switch input state. While moving gear selector through all gear positions Park to 1 and back to Park, watch DRB III display. Did the DRB III display show P/N and D/R in the correct gear positions? Yes → Go To 3 No → Refer to symptom *CHECKING PARK/NETURAL SWITCH OPERATION in the TRANSMISSION category.	All
3	Turn ignition off. Check the Battery Cables for high resistance. (Use service procedure) Did either Battery Circuit have a voltage drop greater than 0.2 volt? Yes → Repair the Battery Circuit for high resistance. Perform the Powertrain Verification Test - Ver 1. No → Go To 4	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Disconnect the Starter Relay. Using a 12-volt test light, check the Fused B(+) Circuit at the Starter Relay. Is the light illuminated and bright? Yes → Go To 5 No → Repair the Fused B(+) Circuit for an open or high resistance. Perform the Powertrain Verification Test - Ver 1.	All
5	Turn the ignition off. Disconnect the Starter Relay. Turn ignition on. Using a 12-volt test light, check the Ignition Switch Output Circuit at the Starter Relay Connector. While observing 12-volt test light, hold ignition key in the start position. Is the light illuminated and bright? Yes → Go To 6 No → Repair the Ignition Switch Output Circuit for an open or high resistance. Perform the Powertrain Verification Test - Ver 1.	All
6	Turn ignition off. Disconnect the Starter Relay. Disconnect the PCM. With an Ohmmeter, measure the Starter Relay Control Circuit from the Relay to the PCM. Is the resistance below 5.0 ohms? Yes → Go To 7 No → Repair the open Starter Relay Control Circuit. Perform the Powertrain Verification Test - Ver 1.	All
7	Turn ignition off. Disconnect the Starter Relay. **Warning: The Parking Brake must be on and the Transmission must be in park for a vehicle equipped with an automatic transmission or the clutch pedal depressed for a vehicle equipped with a manual transmission.** **Warning: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between Starter Rly B(+) and Output Circuits. Did the Starter Motor crank the engine? Yes → Replace the starter relay. Perform the Powertrain Verification Test - Ver 1. No → Go To 8	All
8	Ensure the engine is able to turn over and is not seized. Is the engine able to turn over? Yes → Go To 9 No → Repair the mechanical condition preventing the starter motor from cranking. Perform the Powertrain Verification Test - Ver 1.	All

*NO CRANK CONDITION — Continued

TEST	ACTION	APPLICABILITY
9	Turn ignition off. Disconnect the Starter Relay. **Warning: The Parking Brake must be on and the Transmission must be in park for a vehicle equipped with an automatic transmission or the clutch pedal depressed for a vehicle equipped with a manual transmission.** **Warning: The engine may be cranked in the next step. Keep away from moving engine parts.** Briefly connect a jumper wire between Starter Rly B(+) and Output Circuits. Did the Starter Motor Crank the Engine? Yes → Go To 10 No → Replace the Starter. Perform the Powertrain Verification Test - Ver 1.	All
10	If there are no possible causes remaining, replace the Powertrain Control Module. View repair options. Repair Replace the PCM. Perform the Powertrain Verification Test - Ver 1.	All

Symptom:

***NO RESPONSE FROM PCM WITH A NO START CONDITION**

POSSIBLE CAUSES
EGR SOLENOID DEFECTIVE
SHORT RUNNER VALVE DEFECTIVE
FUSED IGNITION SWITCH OUTPUT CIRCUIT OPEN
PCM GROUND CIRCUIT(S) OPEN
″NO RESPONSE″ DISPLAYED FROM DRB
ASD RELAY OUTPUT CIRCUIT SHORTED TO GROUND
FUEL INJECTOR(S)
GENERATOR SHORTED TO GROUND
IGNITION COIL DEFECTIVE
O2 SENSOR(S)
CAPACITOR DEFECTIVE
FUSED B(+) CIRCUIT OPEN BETWEEN FUSE/BATTERY
FUSED B(+) CIRCUIT OPEN BETWEEN FUSE/PCM
FUSED B(+) CIRCUIT SHORTED TO GROUND

TEST	ACTION	APPLICABILITY
1	With the DRB, attempt to read trouble codes. Was the ignition on when the ″NO RESPONSE″ message was displayed? Yes → Go To 2 No → Turn ignition on to get a response. Perform Powertrain Verification Test VER-1A.	All
2	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Turn the ignition key on. Use a 12 volt test light in the following step. With the 12V test light connected to ground, probe the Fused Ignition in the PCM Connector. Is the test light illuminated and bright? Yes → Go To 3 No → Repair the open or high resistance Fused Ignition Switch Output Circuit between PCM & Ignition Switch. Perform the Powertrain Verification Test - Ver 1.	All

*NO RESPONSE FROM PCM WITH A NO START CONDITION — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. Disconnect the Powertrain Control Module Connector. **Note: Check connectors - Clean/repair as necessary.** Use a 12 volt test light in the following step. Connect 12V test light to B(+). Probe the Ground Circuits, one at a time, in the PCM Connector. Was the light illuminated and bright in each circuit? Yes → Go To 4 No → Repair the ground(s) for an open or high resistance at the Powertrain Control Module. Perform the Powertrain Verification Test - Ver 1.	All
4	Turn ignition off. Disconnect the Powertrain Control Module Connector. Turn ignition on. With a Voltmeter, measure the Fused B(+) Circuit in the PCM Connector. Is the voltage above 10.0 volts? Yes → Refer to symptom *NO RESPONSE FROM PCM (SCI ONLY) in the COMMUNICATION category. No → Go To 5	All
5	Remove the Fuse in the PDC that supplies Fused B(+) to the PCM. Inspect the Fuse. Is the Fuse OK? Yes → Go To 6 No → Go To 8	All
6	Remove the fuse in the PDC that supplies Fused B (+) to the PCM. Using a Voltmeter, measure the B (+) side of the Fuse Socket. Is the voltage above 10.0 volts? Yes → Go To 7 No → Repair the open B(+) Circuit from Fuse to the Battery. Perform Powertrain Verification Test VER-1A.	All
7	Remove the fuse in the PDC that supplies Fused B (+) to the PCM. Disconnect the PCM. Using a ohmmeter, measure the resistance between the fuse and the PCM. Is the resistance below 5.0 ohms? Yes → Test Complete. No → Repair the open Fused B(+) Circuit from Fuse to PCM. Perform Powertrain Verification Test VER-1A.	All
8	Turn ignition off. Disconnect the ASD Relay. With an Ohmmeter, measure the ASD Relay Output Circuit resistance in the ASD Relay Connector to ground. Is the resistance below 5.0 ohms? Yes → Go To 9 No → Go To 17	All

*NO RESPONSE FROM PCM WITH A NO START CONDITION — Continued

TEST	ACTION	APPLICABILITY
9	Turn ignition off. Disconnect the Auto Shutdown Relay. Disconnect the Oxygen Sensor connectors one at a time. With an Ohmmeter, measure the ASD Relay Output Circuit for resistance to ground. Did the resistance go above 5.0 ohms when any O2 sensor was disconnected? Yes → Measure the ASD Relay Output Circuit in each O2 Sensor for resistance to ground. Replace the O2 Sensor that has continuity to ground. Replace Fuse. Perform Powertrain Verification Test VER-1A. No → Go To 10	All
10	Turn ignition off. Disconnect the Auto Shutdown Relay. Disconnect all Oxygen Sensor connectors. Disconnect the EGR Solenoid harness connector. With an Ohmmeter, measure the ASD Relay Output Circuit for resistance to ground. Did the resistance go from below 5.0 ohms to above 5.0 ohms? Yes → Replace the EGR Solenoid. Perform Powertrain Verification Test VER-1A. No → Go To 11	All
11	Turn ignition off. Disconnect the Auto Shutdown Relay. Disconnect all Oxygen Sensor connectors. Disconnect the Short Runner Valve harness connector. With an Ohmmeter, measure the ASD Relay Output Circuit for resistance to ground. Did the resistance go from below 5.0 ohms to above 5.0 ohms? Yes → Replace the Short Runner Valve. Perform Powertrain Verification Test VER-1A. No → Go To 12	All
12	Turn ignition off. Disconnect the Auto Shutdown Relay. Disconnect all Oxygen Sensor connectors. Disconnect the Capacitor. With an Ohmmeter, measure the ASD Relay Output Circuit for resistance to ground. Did the resistance go from below 5.0 ohms to above 5.0 ohms? Yes → Replace the Capacitor. Perform Powertrain Verification Test VER-1A. No → Go To 13	All
13	Turn ignition off. Disconnect the Auto Shutdown Relay. Disconnect all Oxygen Sensor connectors. Disconnect the Injector Connectors one at a time. With an Ohmmeter, measure the ASD Relay Output Circuit for resistance to ground. Did the resistance go above 5.0 ohms when any of the Injector Connectors were disconnected? Yes → Replace the Fuel Injector that caused a change in resistance. Replace Fuse. Perform Powertrain Verification Test VER-1A. No → Go To 14	All

*NO RESPONSE FROM PCM WITH A NO START CONDITION — Continued

TEST	ACTION	APPLICABILITY
14	Turn ignition off. Disconnect the Auto Shutdown Relay. Disconnect all Oxygen Sensor connectors. Disconnect the Generator. With an Ohmmeter, measure the ASD Relay Output Circuit for resistance to ground. Did the resistance go from below 5.0 ohms to above 5.0 ohms? Yes → Repair Generator for a short to ground. Replace Fuse. Perform Powertrain Verification Test VER-1A. No → Go To 15	All
15	Turn ignition off. Disconnect the Auto Shutdown Relay. Disconnect all Oxygen Sensor connectors. Disconnect the ignition coil connectors one at a time. With an Ohmmeter, measure the ASD Relay Output Circuit for resistance to ground. Did the resistance go from below to above 5.0 ohms when any of the ignition coils was disconnected? Yes → Replace the Ignition Coil that caused the resistance to go above 5.0 ohms.. Replace Fuse. Perform Powertrain Verification Test VER-1A. No → Go To 16	All
16	If there are no potential causes remaining, the ASD Relay Output circuit is assumed to be shorted to ground. View repair options. Repair Repair ASD Relay Output Circuit for Harness short to ground. Replace Fuse. Perform Powertrain Verification Test VER-1A.	All
17	Turn ignition off. Remove the Fuse in the PDC that supplies Fused B(+) to PCM Cavity A22. Disconnect the Auto Shutdown Relay. Disconnect the Powertrain Control Module Connector. With an Ohmmeter, measure the Fused B(+) Circuit in PCM Connector to ground. Is the resistance below 5.0 ohms? Yes → Repair the Fused B(+) Circuit for a short to ground. Replace Fuse. Perform Powertrain Verification Test VER-1A. No → Test Complete.	All

Symptom:
*START AND STALL CONDITION

POSSIBLE CAUSES
FUEL FILTER/PRESSURE REGULATOR (HIGH)
FUEL PUMP CAPACITY (VOLUME) OUT OF SPECS
FUEL SYSTEM DISABLED BY VTSS/SKIM
OTHER POSSIBLE CAUSES FOR START & STALL
HIGH RESISTANCE IN THE FUEL PUMP RELAY OUTPUT CIRCUIT
FUEL PUMP INLET STRAINER PLUGGED
TPS VOLTAGE CHANGE NOT SMOOTH
TPS VOLTAGE GREATER THAN 0.92 VOLTS WITH THROTTLE CLOSED
HIGH RESISTANCE IN THE FUEL PUMP GROUND CIRCUIT
FUEL PUMP MODULE
KINKED/RESTRICTED FUEL SUPPLY LINE
ECT SENSOR (OUT OF CALIBRATION)

TEST	ACTION	APPLICABILITY
1	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** **Note: 2.7L engines require the use of Miller Tool #6539 (adapter) installed in-line to the fuel supply line. Disconnect the fuel supply line at the fuel rail connection, install tool #6539, then connect a fuel pressure gauge to tool #6539.** **Note: 3.2L/3.5L engines have a pressure test port on the fuel rail. Remove the pressure test port cap at the fuel rail test port. Connect a fuel pressure gauge to the test port pressure fitting on the fuel rail.** Ignition on. With the DRB, actuate the ASD Fuel System test and observe the fuel pressure gauge. **Note: Fuel pressure specification is 406 KPa +/- 34 KPa (59 psi +/- 5 psi).** Choose a conclusion that best matches your fuel pressure reading. Below Specification Go To 2 Within Specification Go To 12 Above Specification Replace the fuel filter/pressure regulator. **Caution: Stop All Actuations.**	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
2	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 3 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
3	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 4 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
4	Turn the ignition on. With the DRB in Inputs/Outputs, read the ″Veh Theft Security″ status. Does the ″Veh Theft Security″ status read ″Fuel On″? Yes → Go To 5 No → Refer to the Symptom list for problems related to Vehicle Theft/ Security. Make sure the PCI Bus is functional and that the SKIM is communicating on the PCI Bus.	All
5	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Turn ignition on. With the DRB, actuate the ASD Fuel System test. Using a 12 volt test light connected to ground, check the fuel pump relay output circuit (A141) at connector C308. Does the test light illuminate brightly? Yes → Go To 6 No → Repair the high resistance in the fuel pump relay ouput circuit. Check wire from PDC to fuel pump module connector. Also check for bad relay. Perform Powertrain Verification Test VER-1A. **Caution: Stop All Actuations.**	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
6	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn Ignition On. With the DRB in sensors, read the ″Eng Coolant Tmp Deg″ value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ″Eng Coolant Tmp Deg″ value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Was the ″Eng Coolant Tmp Deg″ value increase a smooth transition and did it reach at least 180°? Yes → Go To 7 No → Replace the Engine Coolant Temperature Sensor. Perform the Powertrain Verification Test - Ver 5.	All
7	Turn ignition off. Disconnect connector C308 that is located under the rear seat. This is an in-line connector that leads to the fuel pump module. **Note: Check connectors - It is critical that the connector is free from any signs of corrosion or deformities - Clean/repair as necessary.** Using a test light connected to B+, check the fuel pump ground circuit (Z1) at connector C308. Does the test light illuminate brightly? Yes → Go To 8 No → Repair the high resistance in the fuel pump ground circuit. Perform Powertrain Verification Test VER-1 **Note: Re-connect connector C308 before performing the next test.**	All
8	Visually inspect the fuel supply line from the fuel tank to the fuel rail. Look for any signs of physical damage that may restrict the supply line. Were any problems found with the fuel supply line? Yes → Repair/replace fuel supply line as necessary. No → Go To 9	All
9	The following additional items should be checked as a possible cause for a start and stall condition. Refer to any Technical Service Bulletins (TSB's) that may apply to the symptom. Fuel must be free of contamination. The exhaust system must be free of any restrictions. The engine compression must be within specifications. The engine valve timing must be within specifications. Do any of the above conditions exist? Yes → Repair as necessary. No → Go To 10	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
10	**Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose,fitting or line, the fuel system pressure must be released.** Remove the Fuel Pump Module and inspect the Fuel Inlet Strainer. Is the Fuel Inlet Strainer plugged? Yes → Replace the Fuel Pump Inlet Strainer. No → Go To 11	All
11	If there are no possible causes remaining, replace the Fuel Pump Module. View repair options. Repair Replace the Fuel Pump Module.	All
12	Ignition On, Engine Not Running. With the DRBIII®, read the TPS voltage. While monitoring the DRBIII®, slowly open and close the Throttle. Is the voltage change smooth? Yes → Go To 13 No → Replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
13	Ignition On, Engine Not Running. With the DRB, read TP Sensor voltage. Throttle must be against stop. Is the voltage 0.92 or less with the Throttle closed? Yes → Go To 14 No → Check for a binding throttle condition. If OK, replace the Throttle Position Sensor. Perform Powertrain Verification Test VER-5.	All
14	Turn the ignition on. With the DRB in Inputs/Outputs, read the ″Veh Theft Security″ status. Does the ″Veh Theft Security″ status read ″Fuel On″? Yes → Go To 15 No → Refer to the Symptom list for problems related to Vehicle Theft/ Security. Make sure the PCI Bus is functional and that the SKIM is communicating on the PCI Bus.	All

*START AND STALL CONDITION — Continued

TEST	ACTION	APPLICABILITY
15	**Note: For this test to be valid, the thermostat must be operating correctly.** **Note: This test works best if performed on a cold engine (cold soak)** Turn Ignition On. With the DRB in sensors, read the ″Eng Coolant Tmp Deg″ value. If the engine was allowed to sit overnight (cold soak), the temperature value should be a sensible value that is somewhere close to the surrounding temperature (ambient temperature). **Note: If engine coolant temperature is above 82°C (180°F), allow the engine to cool until 65°C (150°F) is reached.** Start the Engine. During engine warm-up, monitor the ″Eng Coolant Tmp Deg″ value. The temp deg value change should be a smooth transition from start up to normal operating temp 82°C (180°F). The value should reach at least 82°C (180°F). Was the ″Eng Coolant Tmp Deg″ value increase a smooth transition and did it reach at least 180°? Yes → Go To 16 No → Replace the Engine Coolant Temperature Sensor. Perform the Powertrain Verification Test - Ver 5.	All
16	Turn ignition off. **Warning: The fuel system is under a constant pressure (even with the engine off). Before testing or servicing any fuel system hose, fitting or line, the fuel system pressure must be released.** Disconnect the fuel supply line at the fuel rail. Connect fuel line adapter #6539(5/16″) or #6631(3/8″) to the disconnected fuel supply line. Insert the other end of the adapter into a graduated container. **Caution: Do not operate the fuel pump for more than 7 seconds in the next step. Fuel pump module reservoir may run empty and damage to the fuel pump will result.** **Note: Specification: A good fuel pump will deliver at least 1/4 liter (1/2 pint) of fuel in 7 seconds.** With the DRB, actuate the ASD Fuel System test for 7 seconds. Is the fuel pump capacity within specification? Yes → Go To 17 No → Check for a kinked/damaged fuel supply line between the fuel tank and fuel rail. If OK, replace the fuel pump module. **Caution: Stop All Actuations.**	All
17	The following additional items should be checked as a possible cause for a start and stall condition. Refer to any Technical Service Bulletins (TSB's) that may apply to the symptom. Fuel must be free of contamination. The exhaust system must be free of any restrictions. The engine compression must be within specifications. The engine valve timing must be within specifications. Do any of the above conditions exist? Yes → Repair as necessary. No → Test Complete.	All

Symptom:
P1899-P/N SWITCH STUCK IN PARK OR IN GEAR

When Monitored and Set Condition:

P1899-P/N SWITCH STUCK IN PARK OR IN GEAR

When Monitored: Continuously with the transmission in Park, Neutral, or Drive and NOT in Limp-in mode.

Set Condition: This code will set if the PCM detects an incorrect Park/Neutral switch state for a given mode of vehicle operation.

POSSIBLE CAUSES
INTERMITTENT PARK/NEUTRAL SWITCH SENSE CIRCUIT
TRANSMISSION RANGE SENSOR DEFECTIVE
P/N SWITCH SENSE CIRCUIT OPEN
P/N SWITCH SENSE CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (P/N SWITCH INPUT ERROR)

TEST	ACTION	APPLICABILITY
1	With the DRBIII® read DTC's. Is the Good Trip Counter for P-1899 displayed and Equal to 0? Yes → Go To 2 No → Go To 7	All
2	Turn ignition on. Engine Not Running. With the DRBIII® read the Park/Neutral Switch input state. While moving gear selector through all gear positions Park to 1 and back to Park, watch DRBIII® display. Did the DRB III display show P/N and D/R in the correct gear positions? Yes → Test Complete. No → Go To 3	All
3	Turn ignition off. Disconnect the PCM harness connector. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the P/N Switch Sense Circuit from the PCM Connector to the Transmission Range Sensor. Is the resistance below 5.0 ohms? Yes → Go To 4 No → Repair open P/N Switch Sense Circuit. Perform the 42LE Transmission Verification Test - Ver 1.	All

P1899-P/N SWITCH STUCK IN PARK OR IN GEAR — Continued

TEST	ACTION	APPLICABILITY
4	Turn ignition off. Disconnect the PCM harness connector. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the P/N Switch Sense circuit between the Transmission Range Sensor and ground. Is the resistance below 5.0 ohms? Yes → Repair the P/N Switch Sense Circuit for a short to ground. Perform the 42LE Transmission Verification Test - Ver 1. No → Go To 5	All
5	Turn the ignition off. Disconnect the PCM harness connector. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through the gears, measure the resistance of the P/N Position Switch Sense circuit to ground B(-) in the PCM connector. Did the display switch from above 10.0 ohms to below 10.0 ohms? Yes → Go To 6 No → Replace the Transmission Range Sensor. Perform the 42LE Transmission Verification Test - Ver 1.	All
6	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the 42LE Transmission Verification Test - Ver 1.	All
7	At this time, the conditions required to set the DTC are not present. **Note: Use the Freeze Frame Data to help you duplicate the conditions that set the DTC. Pay particular attention to the DTC set conditions, such as, VSS, MAP, ECT, and Load.** **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any technical service bulletins that may apply.** Were any problems found? Yes → Repair as necessary. Perform the 42LE Transmission Verification Test - Ver 1. NO- TEST COMPLETE Test Complete.	All

Symptom:
*CHECKING PARK/NETURAL SWITCH OPERATION

POSSIBLE CAUSES
TRANSMISSION RANGE SENSOR DEFECTIVE
P/N SWITCH SENSE CIRCUIT OPEN
P/N SWITCH SENSE CIRCUIT SHORTED TO GROUND
POWERTRAIN CONTROL MODULE (P/N SWITCH INPUT ERROR)

TEST	ACTION	APPLICABILITY
1	Turn ignition on. Engine Not Running. With the DRBIII® read the Park/Neutral Switch input state. While moving gear selector through all gear positions Park to 1 and back to Park, watch DRBIII® display. Did the DRB III display show P/N and D/R in the correct gear positions? Yes → Test Complete. No → Go To 2	All
2	Turn ignition off. Disconnect the PCM harness connector. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the P/N Switch Sense Circuit from the PCM Connector to the Transmission Range Sensor. Is the resistance below 5.0 ohms? Yes → Go To 3 No → Repair open P/N Switch Sense Circuit. Perform the 42LE Transmission Verification Test - Ver 1.	All
3	Turn ignition off. Disconnect the PCM harness connector. Disconnect the Transmission Range Sensor harness connector. **Note: Check connectors - Clean/repair as necessary.** Measure the resistance of the P/N Switch Sense circuit between the Transmission Range Sensor and ground. Is the resistance below 5.0 ohms? Yes → Repair the P/N Switch Sense Circuit for a short to ground. Perform the 42LE Transmission Verification Test - Ver 1. No → Go To 4	All
4	Turn the ignition off. Disconnect the PCM harness connector. Move the Gear selector through all gear positions, from Park to 1st and back. While moving the gear selector through the gears, measure the resistance of the P/N Position Switch Sense circuit to ground B(-) in the PCM connector. Did the display switch from above 10.0 ohms to below 10.0 ohms? Yes → Go To 5 No → Replace the Transmission Range Sensor. Perform the 42LE Transmission Verification Test - Ver 1.	All

*CHECKING PARK/NETURAL SWITCH OPERATION — Continued

TEST	ACTION	APPLICABILITY
5	If there are no possible causes remaining, replace the PCM. View repair options. Repair Replace the Powertrain Control Module. Perform the 42LE Transmission Verification Test - Ver 1.	All

Symptom List:

ANTENNA FAILURE
COP FAILURE
EEPROM FAILURE
INTERNAL FAULTS
RAM FAILURE
SERIAL LINK INTERNAL
STACK OVERFLOW FAILURE

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be ANTENNA FAILURE.

When Monitored and Set Condition:

EEPROM FAILURE

When Monitored: At ignition ON and during the SKIM programming process, which programs SKIM's PIN the VIN, country code or additional keys.

Set Condition: This condition is set when an error occurs during programming the SKIM's EEPROM. The other condition that causes this code to mature is an EEPROM I2C link failure.

POSSIBLE CAUSES
SKIM INTERNAL DTC FAILURE

TEST	ACTION	APPLICABILITY
1	**Note: This trouble code indicates an internal SKIM fault.** With the the DRBIII®, read and record SKIM DTC's and then erase SKIM DTC's Perform several key cycles, leaving the key on for a minimum of 30 seconds per cycle. With the DRB III®, read SKIM trouble codes. Did the SKIM Internal DTC return? Yes → Replace the Sentry Key Immobilizer Module. Perform the SKIS Verification Test. No → Test Complete.	All

Symptom List:

PCM STATUS FAILURE
ROLLING CODE FAILURE
SERIAL LINK EXTERNAL FAULT

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be PCM STATUS FAILURE.

When Monitored and Set Condition:

PCM STATUS FAILURE

When Monitored: This condition is monitored at ignition ON and continuously during an ignition ON cycle.

Set Condition: This condition exists when a PCM STATUS bus message was not received from the PCM. Note: Failure maturity time is 20 seconds.

ROLLING CODE FAILURE

When Monitored: At ignition ON, after ignition ON during any rolling code handshake that occurs with the PCM due to a SKIM or a PCM reset.

Set Condition: This condition exists when a PCM STATUS message is not received by the SKIM within 3.5 seconds of transmitting what the SKIM believes to be a 'key code' message to the PCM. The 'key code' sent by the SKIM may or may not be valid in this case.

SERIAL LINK EXTERNAL FAULT

When Monitored: At ignition ON, after ignition ON during any rolling code handshake that occurs with the PCM due to a SKIM reset or a PCM reset, or during 'Secret Key' transfers to the PCM.

Set Condition: This condition is set when the SKIM does not receive an expected bus message transmission acknowledgment from the PCM after 3 transmit attempts.

POSSIBLE CAUSES
INTERMITTENT WIRING HARNESS PROBLEM
WIRING HARNESS INSPECTION
SKIM/PCM DEFECTIVE

PCM STATUS FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	**Note: Ensure the PCM has proper powers and grounds before continuing.** Using the DRB, erase the codes. Turn ignition off. Wait 10 seconds. Turn ignition on. Using the DRB, read the codes. Does the DRB display the code that was previously erased? Yes → Go To 2 No → Go To 4	All
2	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair as necessary. Perform the SKIS Verification Test. No → Go To 3	All
3	Replace the Sentry Key Immobilizer Module. Using the DRB, erase the codes. Drive vehicle. Perform several key cycles. Does the code appear? Yes → Replace the Powertrain Control Module. Perform the SKIS Verification Test. No → Test Complete.	All
4	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the SKIS Verification Test. No → Test Complete.	All

Symptom List:

TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE
TRANSPONDER COMMUNICATION FAILURE
TRANSPONDER ID MISMATCH
TRANSPONDER RESPONSE MISMATCH

Test Note: All symptoms listed above are diagnosed using the same tests. The title for the tests will be TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE.

When Monitored and Set Condition:

TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE

When Monitored: At ignition ON and during Key Programming Mode.

Set Condition: This condition exists when 5 consecutive transponder signal transmissions are sent to the SKIM with the correct message format but with invalid data.

TRANSPONDER COMMUNICATION FAILURE

When Monitored: At ignition ON and during Key Programming Mode.

Set Condition: This condition exists when an invalid message format is received from the transponder after 5 consecutive transponder read attempts.

TRANSPONDER ID MISMATCH

When Monitored: At ignition ON and during Key Programming Mode.

Set Condition: This condition exists when the transponder ID read by the SKIM does not match any of those transponder ID's stored in the SKIM's memory.

TRANSPONDER RESPONSE MISMATCH

When Monitored: At ignition ON and during Key Programming Mode.

Set Condition: This condition exists when the transponder's secret algorithm result fails to match the SKIM's result.

POSSIBLE CAUSES
INTERMITTENT WIRING HARNESS PROBLEM
SKIM

TRANSPONDER (CYCLIC REDUNDANCY CHECK) CRC FAILURE — Continued

TEST	ACTION	APPLICABILITY
1	Using the DRB, erase the codes. Turn ignition off. Wait 10 seconds. Turn ignition on. Using the DRB, read the codes. Does the DRB display the code that was previously erased? Yes → Go To 2 No → Go To 5	All
2	Using the DRB, attempt to reprogram the ignition keys to SKIM. Using the DRB, erase the codes. Wait 10 seconds. Turn the ignition on. Using the DRB, read the trouble codes. Does the code reset. Yes → Go To 3 No → Test Complete.	All
3	Replace the ignition key with a new key. Using the DRB, program the new ignition key to the SKIM. Using the DRB, erase the codes. Turn ignition off. Wait 10 seconds. Turn ignition on. Using the DRB, read the codes. Does the code appear? Yes → Go To 4 No → Test Complete.	All
4	If there are no possible causes remaining, replace the SKIM. View repair options. Repair Replace the Sentry Key Immobilizer Module. Perform the SKIS Verification Test.	All
5	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the SKIS Verification Test. No → Test Complete.	All

Symptom:
VIN MISMATCH

When Monitored and Set Condition:

VIN MISMATCH

When Monitored: Monitored continuously during the engine RUN cycle.

Set Condition: This condition exists when the VIN received from the PCM does not match the VIN stored in the SKIM's EEPROM. Note: Failure maturity time may take up to 3 minutes.

POSSIBLE CAUSES
PCM DEFECTIVE
INTERMITTENT WIRING HARNESS PROBLEM
SKIM DEFECTIVE

TEST	ACTION	APPLICABILITY
1	Using the DRB, erase the codes. Turn ignition off. Wait 10 seconds. Turn ignition on. Using the DRB, read the codes. Does the DRB display the code that was previously erased? Yes → Go To 2 No → Go To 3	All
2	**Note: Ensure that a VIN has been programed into the PCM. If a VIN is not displayed, attempt to program the PCM with the vehicle VIN before continuing.** Turn ignition on. Using the DRB, select ″Engine″ system from the main menu. Display and record the Vehicle Identification Number (VIN). Does the VIN recorded from the PCM match the VIN of the vehicle? Yes → Replace the Sentry Key Immobilizer Module. Perform the SKIS Verification Test. No → Replace the Powertrain Control Module (PCM). Program the correct VIN into the new PCM and retest. Perform the SKIS Verification Test.	All

VIN MISMATCH — Continued

TEST	ACTION	APPLICABILITY
3	Turn ignition off. **Note: Visually inspect the related wiring harness. Look for any chafed, pierced, pinched, or partially broken wires.** **Note: Visually inspect the related wire harness connectors. Look for broken, bent, pushed out, or corroded terminals.** **Note: Refer to any Technical Service Bulletins (TSB) that may apply.** Were any problems found? Yes → Repair wiring harness/connectors as necessary. Perform the SKIS Verification Test. No → Test Complete.	All

Verification Tests

42LE TRANSMISSION VERIFICATION TEST - VER 1.	APPLICABILITY
1. Connect the DRBIII® to the Data Link Connector (DLC). 2. Reconnect any disconnected components. 3. With the DRBII®, erase all Transmission DTC's, also erase the PCM DTC P-0700 which turns on the MIL indicator. 4. With the DRBIII®, display transmission temperature. Start and run the engine until the transmission temperature is HOT (above 110 deg. F). 5. Check the transmission fluid and adjust if necessary. Add oil slowly (1 pint at a time) to avoid overfilling, especially when cold. Once oil is visible on the dipstick, do not add oil until transmission oil temp is 180 degrees. **6. Note: If the transmission control module or torque converter has been replaced or if the transmission has been repaired or replaced it is necessary to perform the DRBIII® quick learn procedure.** 7. Road test the vehicle. With the DRBIII®, monitor the engine RPM. Make 15 to 20 1-2, 2-3, 3-4 upshifts. Perform these shifts from a standing start to 45 MPH with a constant throttle opening of 20 to 25 degrees. 8. Below 25 MPH, make 5 to 8 wide open throttle kickdowns to 1st gear. Allow at least 5 seconds each in 2nd and 3rd gear between each kickdown. 9. For a specific DTC, drive the vehicle to the Symptom's When Monitored/When Set conditions to verify the DTC repair. 10. Check for Diagnostic Trouble Codes (DTC's) during the road test. If a DTC sets during the road test , return to the Symptom list and follow the path. Were any Trouble Codes set during the road test? Yes → Refer to the Symptom List for appropriate diagnostic tests. Perform the 42LE Transmission Verification Test - Ver 1. No → Repair is complete.	All

Verification Tests — Continued

BODY VERIFICATION TEST - VER 1	APPLICABILITY
1. Disconnect all jumper wires and reconnect all previously disconnected components and connectors. 2. If the Sentry Key Immobilizer Module (SKIM) or the Powertrain Control Module (PCM) were replaced, proceed to number 6. If the SKIM or PCM were not replaced, continue to the next number. 3. If the Body Control Module was replaced, turn the ignition on for 15 seconds (to learn VIN) or engine may not start (if VTSS equipped). If the vehicle is equipped with VTSS, use the DRB and enable VTSS. 4. Program all other options as needed. 5. If any repairs were made to the HVAC System, disconnect the battery or using the DRBIII, recalibrate the HVAC doors. Proceed to number 13. 6. Obtain the Vehicle's unique PIN number assigned to it's original SKIM module from either the vehicle's invoice or from Chrysler's Customer Center (1-800-992-1997). 7. With the DRBIII, select THEFT ALARM, SKIM, MISCELLANEOUS and select ″Skim Module Replaced″ function. Enter the 4 digit PIN number to put SKIM in ″Access Mode″. 8. The DRBIII will prompt you through the following steps. (1) Program the country code into the SKIM's memory. (2) Program the vehicle's VIN number into the SKIM's memory. (3) Transfer the vehicle's Secret Key data from the PCM. 9. Once secured access mode is active, the SKIM will remain in that mode for 60 seconds. 10. Using the DRBIII, program all customer keys into the SKIM's memory. This requires that the SKIM be in secured access mode, using the 4 digit code. 11. Note: If the PCM is replaced, the unique Secret Key data must be transfered from the SKIM to the PCM. This procedure requires the SKIM to be placed in secured access mode using the 4-digit code. 12. Note: If 3 attempts are made to enter secured access mode using an incorrect PIN, secured access mode will be locked out for 1 hour which causes the DRBIII to display ″Bus +− Signals Open″. To exit this mode, turn ignition to the ″Run″ pos. for 1 hour. 13. Ensure all accessories are turned off and the battery is fully charged. 14. Ensure that the Ignition is on, and with the DRBIII, record and erase all Diagnostic Trouble Codes from ALL modules. Start the engine and allow it to run for 2 minutes and fully operate the system that was malfunctioning. 15. Turn the ignition off and wait 5 seconds. Turn the ignition on and using the DRBIII, read DTC's from ALL modules. 16. If ANY codes are present select the appropriate symptom from the Symptom List and continue diagnostics. If NO codes are present and the customers complaint cannot be duplicated, the repair is complete. Repair Repair is not complete, refer to appropriate symptom.	All

Verification Tests — Continued

FUEL SYSTEM/MISFIRE MONITOR VERIFICATION TEST	APPLICABILITY
1. If any existing DTC's have not been repaired, go to Symptom List and follow path specified. 2. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 3. Connect the DRBIII® to the data link connector. 4. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 5. Perform steps 6 through 8 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 6. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 7. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 8. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. **9. Note: Make sure that Misfire detection is enabled if you repaired a Misfire DTC. Low fuel level or an un-learned Adaptive Numerator can disable the Misfire monitor.** **10. Note: If the PCM has been replaced or disconnected during testing, the Adaptive Numerator must be re-learned in order for the Misfire Monitor to run.** 11. With the DRB III®, monitor the Similar Conditions to attempt to duplicate the conditions that the vehicle was operating at when the DTC was set. If the conditions can be duplicated, the Good Trip counter will change to one or more. 12. If the conditions cannot be duplicated, erase trouble codes and disconnect the DRB. 13. If the repaired DTC has reset, or the OBD II monitor failed after running, the repair is not complete. Check for any technical service bulletins or flash updates and return to Symptom List. 14. If a new DTC has set, return to Symptom List and perform the tests specified for that code. 15. If the monitor ran, and the Good Trip counter changed to one or more, the repair was successful. 16. Erase DTC's. 17. Disconnect the DRBIII®. Test complete. Repair Repair is not complete, refer to appropriate symptom.	All

POWERTRAIN VERIFICATION TEST VER - 1	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. Inspect the engine oil for contamination. If it is contaminated, change the oil and filter. 3. Perform the steps 1 through 6 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed a DTC will be set in ABS and Air Bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 7. Attempt to start the engine. 8. If the engine is unable to start, look for any Technical Service Bulletins that may relate to this condition. Return to Symptom List if necessary. 9. If the engine starts and stays running, the repair is now complete. Repair is not complete, refer to appropriate symptom.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 2	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If this verification procedure is being performed after a NO TROUBLE CODE repair, perform steps 3 and 4. 3. Check to see if the initial symptom still exists. If there are no trouble codes or the symptom no longer exists, the repair was successful and is now complete. 4. If the initial or another symptom exists, the repair is not complete. Check all technical service bulletins or flash updates and return to Symptom list if necessary. 5. If this verification procedure is being performed after a TROUBLE CODE repair, perform steps 6 through 11. 6. Connect the DRB to the data link connector. Using the DRB erase any diagnostic trouble codes and reset all values. 7. Perform steps 8 through 10 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 8. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 9. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 10. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 11. Road test vehicle. If the test is for an A/C DTC, ensure it is operating during the following test. Drive vehicle for at least 5 minutes. 12. For some of time go at least 40 mph. At some point stop the vehicle, turn off the engine for at least 10 seconds. Ensure the trans shifts through all gears. When finished read DTCs with the DRB. If a DTC has set, return to Symptom Lists and follow path. 13. If the original DTC did not return, and there are no new DTC's, the repair was successful and testing is complete. Repair is not complete, refer to appropriate symptom.	All

POWERTRAIN VERIFICATION TEST VER - 3	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. Connect the DRB to the Data Link Connector and erase the codes. 3. If the PCM has been replaced perform steps 4 through 6 then continue the verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 7. Ensure no other charging system problems remain by doing the following: Start the engine. Perform generator output per service manual. 8. Raise the engine speed to 2000 rpm for at least 30 seconds. 9. Allow the engine to idle. 10. Turn the engine off. 11. Turn the ignition key on. 12. With the DRB, read trouble code messages. 13. If repaired code has reset, or any other one has set, check all pertinent Technical Service Bulletins and return to Symptom List if necessary. 14. If there are no codes, the repair is now complete. Repair is not complete, refer to appropriate symptom.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 4	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. Connect the DRB to the data link connector and erase all codes. 3. If the PCM has been replaced, perform steps 4 through 6, then continue with the verification. 4. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 5. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 6. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 7. Turn the speed control ON (if equipped, cruise light will be on). 8. Depress and release the SET Switch. If the speed control did not engage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 9. Depress and hold the RESUME/ACCEL Switch. If the vehicle speed did not increase by at least 2 mph, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 10. Press and hold the COAST switch. The vehicle speed should decrease. If it did not decrease, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 11. Using caution, depress and release the brake pedal. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 12. Bring the vehicle speed back up to 35 MPH. 13. Depress the RESUME/ACCEL switch. If the speed control did not resume the previously set speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 14. Hold down the SET switch. If the vehicle did not decelerate, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 15. Ensure vehicle speed is greater than 35 mph and release the SET Switch. If vehicle did not adjust and set a new vehicle speed, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 16. Depress and release the CANCEL switch. If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 17. Bring the vehicle speed back up above 35 mph and engage speed control. 18. Depress the OFF switch to turn OFF, (Cruise light will be off). If the speed control did not disengage, the repair is not complete. Check for TSBs that pertain to speed control problem and then, if necessary, return to Symptom List. 19. If the vehicle successfully passed all of the previous tests, the speed control system is now functioning as designed. The repair is now complete. Repair is not complete, refer to appropriate symptom.	All

Verification Tests — Continued

POWERTRAIN VERIFICATION TEST VER - 5	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If any existing diagnostic trouble codes have not been repaired, go to Symptom List and follow path specified. 3. Connect the DRBIII® to the data link connector. 4. Ensure the fuel tank has at least a quarter tank of fuel. Turn off all accessories. 5. Perform steps 6 through 8 if the PCM has been replaced. Then proceed with the verification. If the PCM has not been replaced skip those steps and continue verification. 6. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 7. For ABS and Air Bag systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Air Bag modules. 8. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 9. If a Comprehensive Component DTC was repaired, perform steps 10-13. If a Major OBDII Monitor DTC was repaired skip those steps and continue verification. 10. After the ignition has been off for at least 10 seconds, restart the vehicle and run 2 minutes. 11. If the Good Trip counter changed to one or more and there are no new DTC's, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®. 12. If the repaired DTC has reset, the repair is not complete. Check for any related TSB's or flash updates and return to the Symptom list. 13. If another DTC has set, return to the Symptom List and follow the path specified for that DTC. 14. With the DRBIII®, monitor the appropriate pre-test enabling conditions until all conditions have been met. Once the conditions have been met, switch screen to the appropriate OBDII monitor, (Audible beeps when the monitor is running). 15. If the monitor ran, and the Good Trip counter changed to one or more, the repair was successful and is now complete. Erase DTC's and disconnect the DRBIII®. 16. If the repaired OBDII trouble code has reset or was seen in the monitor while on the road test, the repair is not complete. Check for any related technical service bulletins or flash updates and return to Symptom List. 17. If another DTC has set, return to the Symptom List and follow the path specified for that DTC. Repair is not complete, refer to appropriate symptom.	All

Verification Tests — Continued

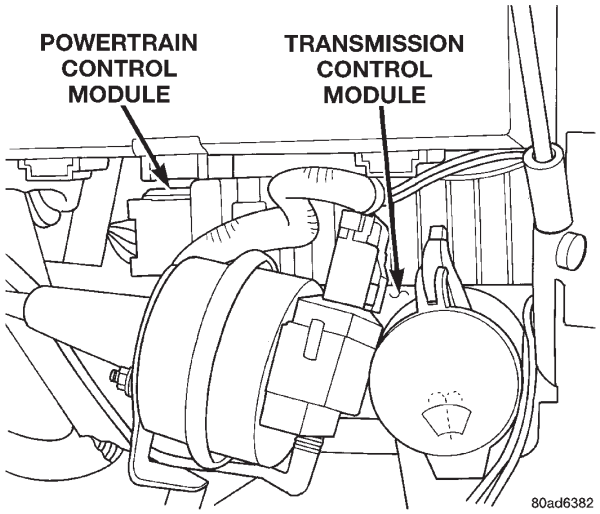
POWERTRAIN VERIFICATION TEST VER - 6	APPLICABILITY
1. Inspect the vehicle to ensure that all engine components are properly installed and connected. Reassemble and reconnect components as necessary. 2. If the PCM was replaced, perform steps 3 through 5 then continue with the verification. Otherwise, skip those steps and continue. 3. If PCM has been changed and correct VIN and mileage have not been programmed, a DTC will be set in ABS and Air bag modules. In addition, if vehicle is equipped with a Sentry Key Immobilizer Module (SKIM), Secret Key data must be updated to enable start. 4. For ABS and Airbag Systems: Enter correct VIN and Mileage in PCM. Erase codes in ABS and Airbag modules. 5. For SKIM theft alarm: Connect DRB to data link conn. Go to Theft Alarm, SKIM, Misc. and place SKIM in secured access mode, by using the appropriate PIN code for this vehicle. Select Update the Secret Key data. Data will be transferred from SKIM to PCM. 6. If any existing diagnostic trouble codes are not repaired, go to symptom list and follow path specified. After all diagnostic trouble codes have been repaired, return to TEST VER-6A and run LDP Dealer Test Mode under Systems Test in DRBIII. 7. The LDP Monitor Test Mode has been added to the DRBIII to verify repairs to the LDP System. A DRB software program was written which causes the PCM to run the LDP Monitor as part of this test. Test failures will be indicated through a stored DTC. 8. LDP Monitor Test Mode is a useful way to run a total system performance test. Use this test to verify any type of LDP system repair. 9. Software program makes temporary changes to operating mode of PCM. For this reason, it is critical that test not be interrupted. PCM's left in this mode as result of interrupted test will illuminate the MIL for 8-10 mi of driving with no DTC's stored. 10. Erasing DTC's will not change this condition. 11. If a vehicle is found to be stuck in the mode described above, the LDP Dealer Test should be re-run in its entirety so that the software program in the DRBIII can restore the PCM operating mode. 12. Note similarity to LDP Monitor screen found under OBDII Monitors. Failure modes are fewer in this System Test than OBDII LDP Monitor. System Test only stores Small Leak DTC to indicate problem with system. No other type of failure mode indication given. 13. System Test failure may have been, for example, due to a large leak, but the PCM will set the Small Leak DTC to indicate failures that occurred as part of the system test. 14. Connect the DRB to the data link connector. Engine running, turn off all accessories. 15. Note: While test is being performed, PCM must see RPM, minimum MAP, No Vehicle speed and minimum Throttle Position sensor (At idle, in park.) With DRBIII in System Tests, perform the LDP Monitor Test and follow the instructions on the screen. 16. If the LDP Monitor Test failed and a Small Leak DTC has set, the repair is not complete. Check for any related Technical Service Bulletins and return to Symptom List. 17. If any other trouble code has set, return to Symptom List and follow the path specified for that trouble code. If the LDP Monitor Test passed, the repair was successful and testing is now complete. Repair is not complete, refer to appropriate symptom.	All

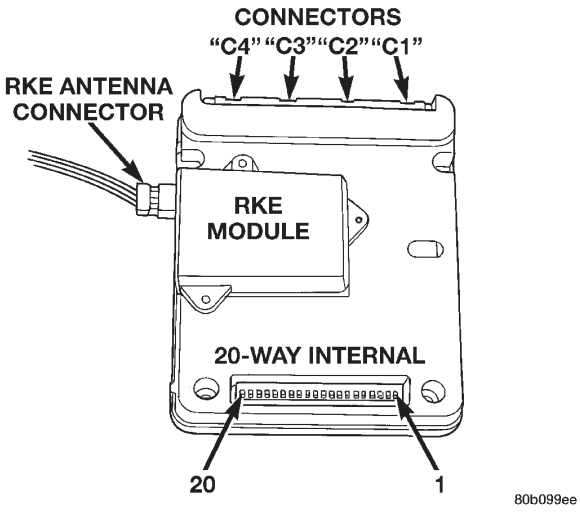
Verification Tests — Continued

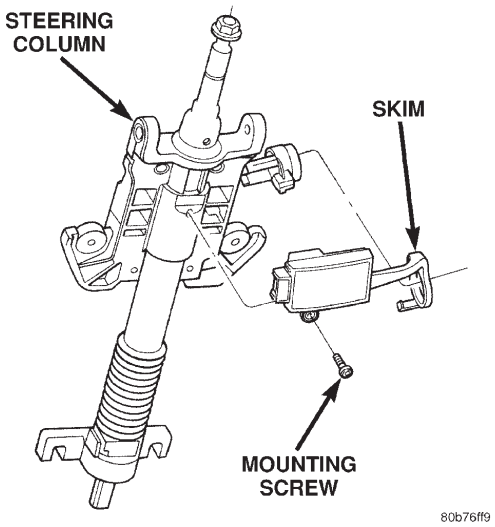
SKIS VERIFICATION	APPLICABILITY
1. Reconnect all previously disconnected components and connectors. 2. Obtain the vehicle's unique Personal Identification Number (PIN) assigned to it's original SKIM. This number can be obtained from the vehicle's invoice or Chrysler's Customer Center (1-800-992-1997). 3. NOTE: When entering PIN, care should be taken because 3 attempts will only be allowed. The SKIM module will then ″lock out″ the DRB III for 1 hour, which will cause the DRB III to display ″Bus +− Signals Open' to SKIM. 4. To exit ″lock out″ mode, the ignition key needs to remain in the ″On″ position continually for one hour. Turn off all accessories and connect a battery charger, if necessary. 5. With the DRB III, select ″Theft Alarm,″ ″Skim,″ ″Miscellaneous,″ then select desired procedure and follow the steps displayed. 6. If the SKIM was replaced, ensure all of the vehicles keys are programmed into the new SKIM. Replace the SKIM if the problem is corrected otherwise return to the Symptom List. Repair is not complete, refer to appropriate symptom. **7. Note: Prior to returning vehicle to the customer, perform a module scan to be sure all DTC's are erased. Erase ANY DTC's that are found.**	All

8.0 SYSTEM COMPONENT LOCATIONS

8.1 POWERTRAIN, BODY AND TRANS CONTROL MODULES

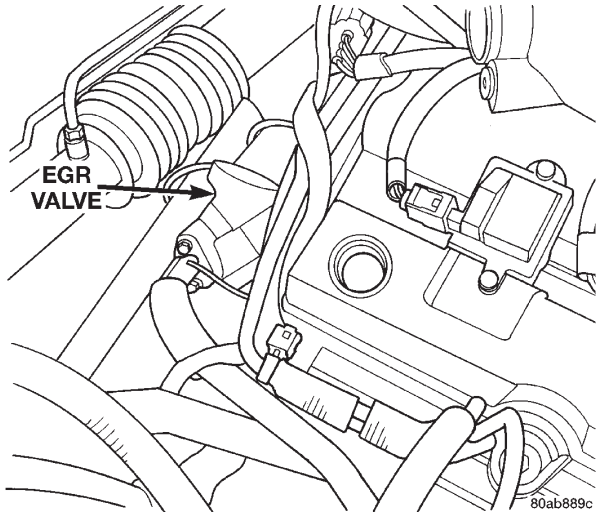




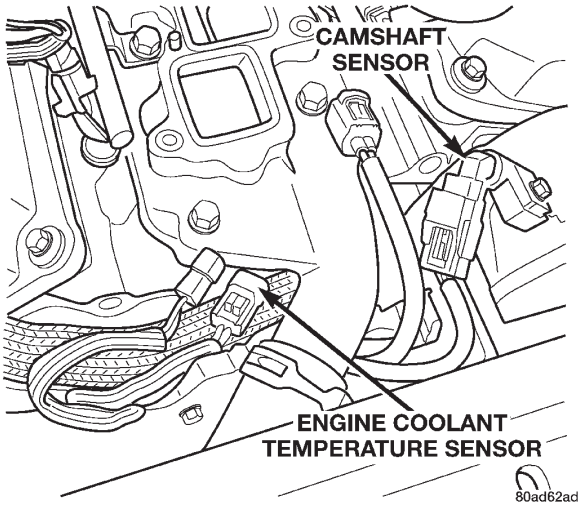


8.2 CONTROLS & SOLENOIDS

2.7L

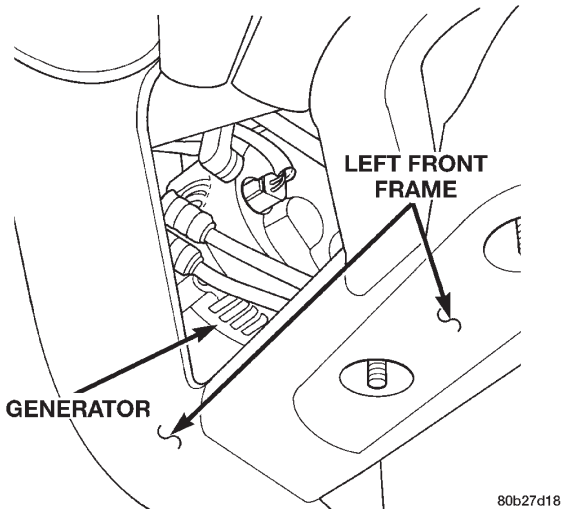


3.2L AND 3.5L

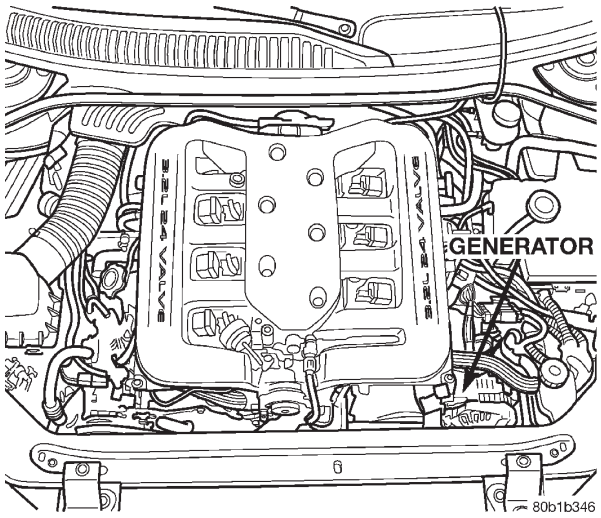


8.2 CONTROLS & SOLENOIDS (Continued)

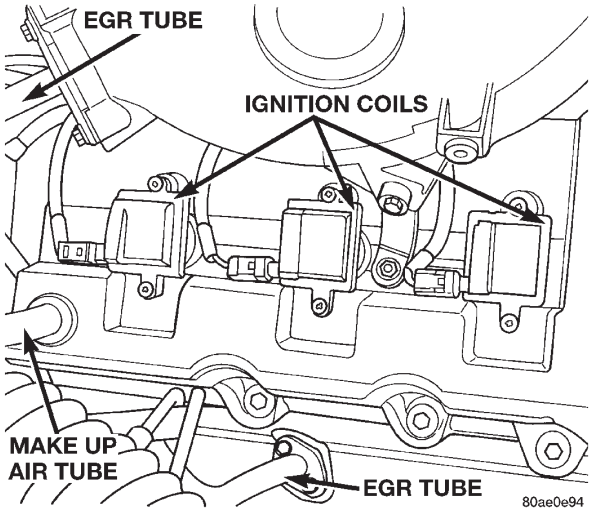
2.7L



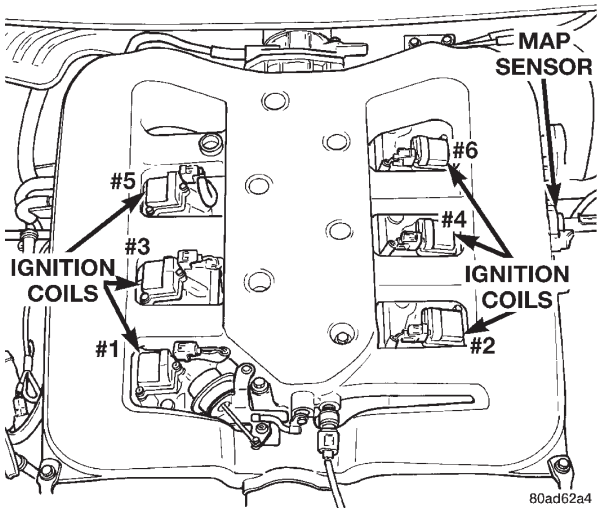
3.2L AND 3.5L

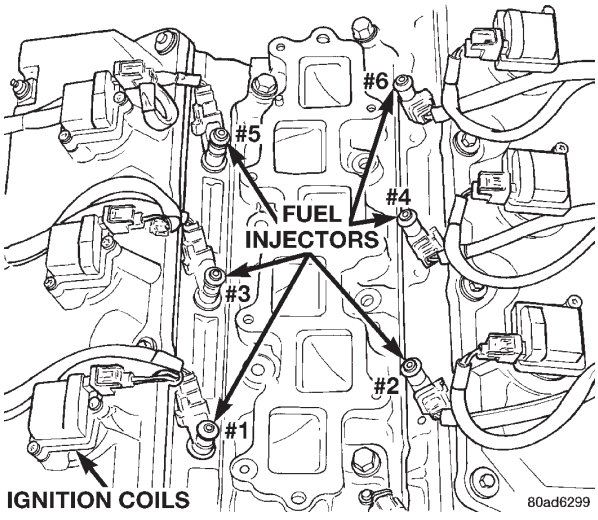


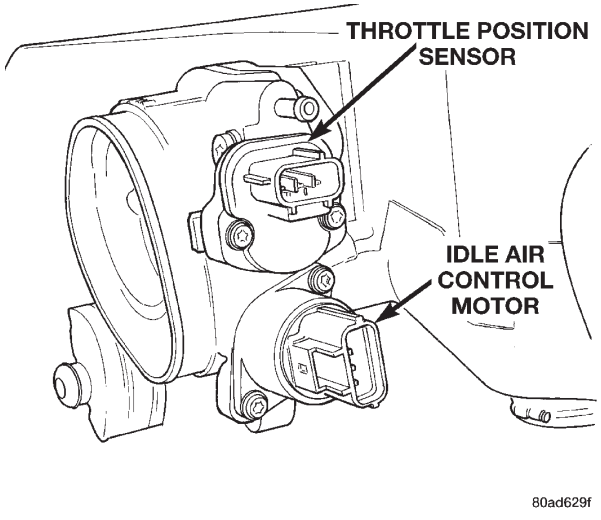
2.7L



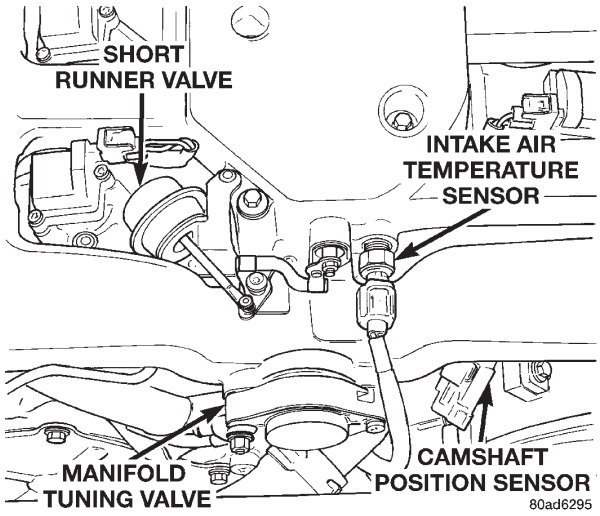
3.2L AND 3.5L

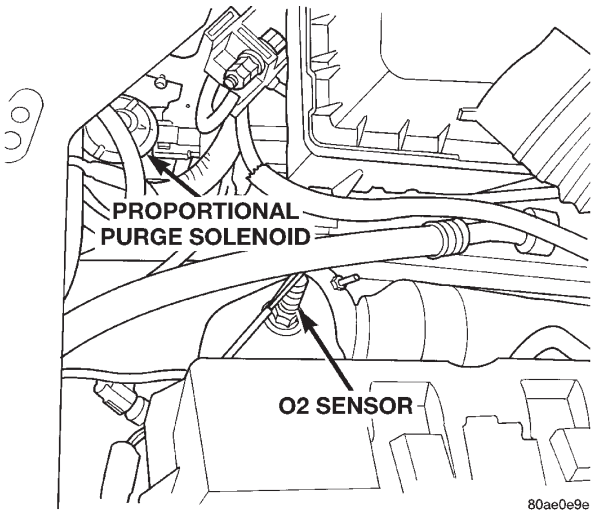


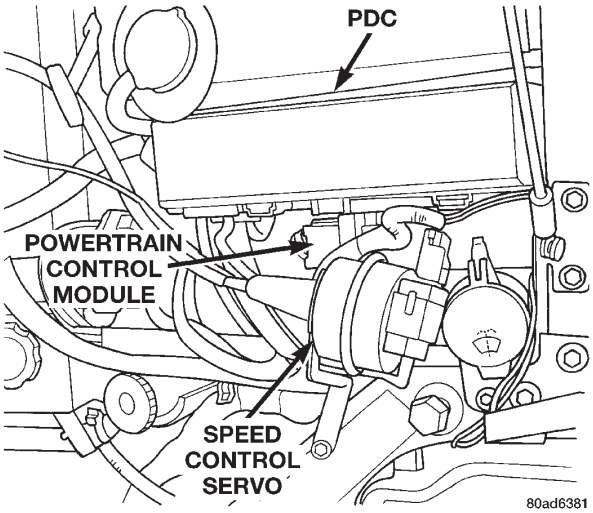




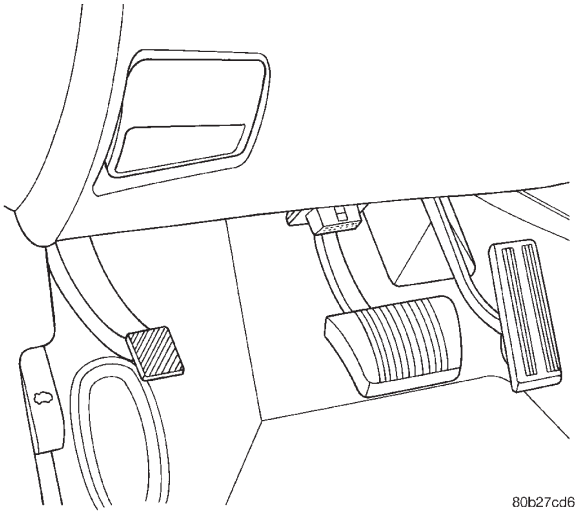
3.2L AND 3.5L







8.3 DATA LINK CONNECTOR



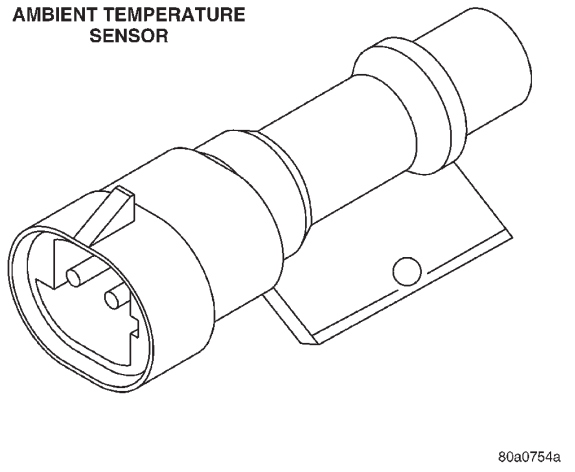
8.4 SENSORS

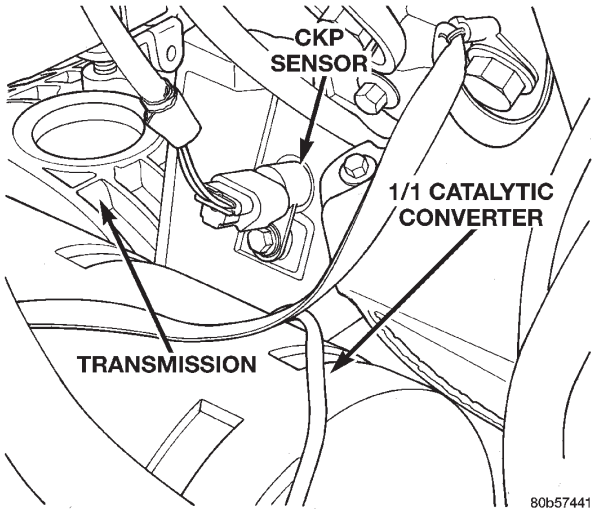
2.7L

The A/C pressure sensor is located in the high pressure line, near the A/C compressor. The connector is a gray connector.

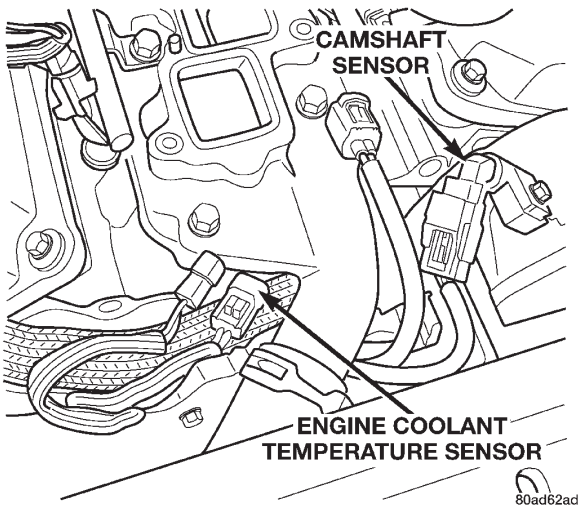
3.2L AND 3.5L

The A/C pressure sensor is located in the high pressure line, near the A/C compressor. The connector is a gray connector.

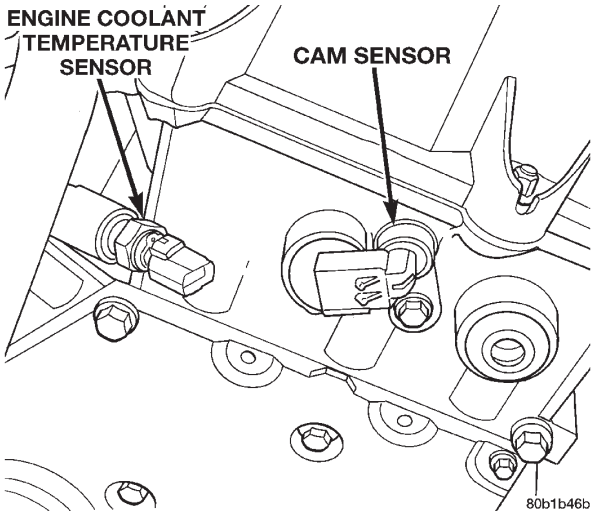




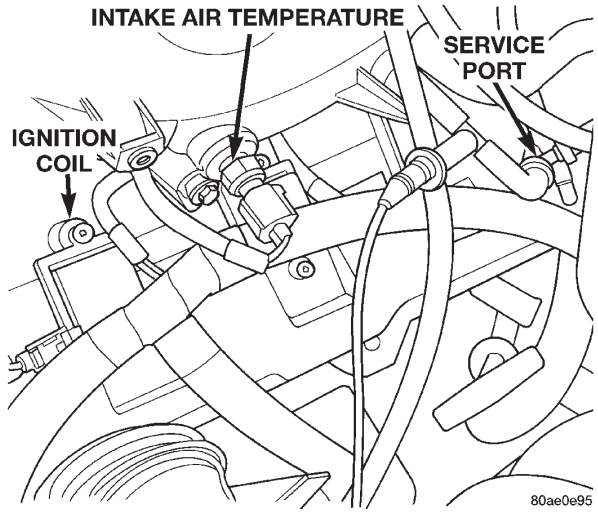
3.2L AND 3.5L



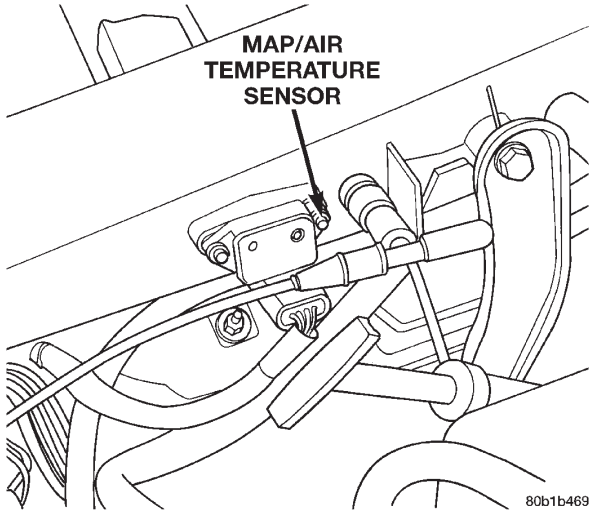
2.7L



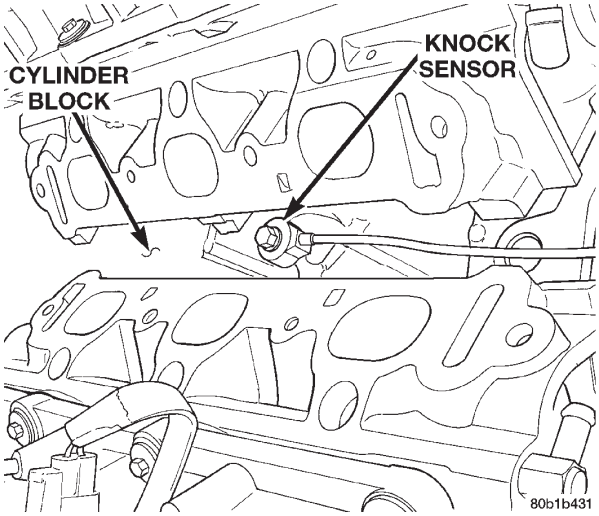
2.7L



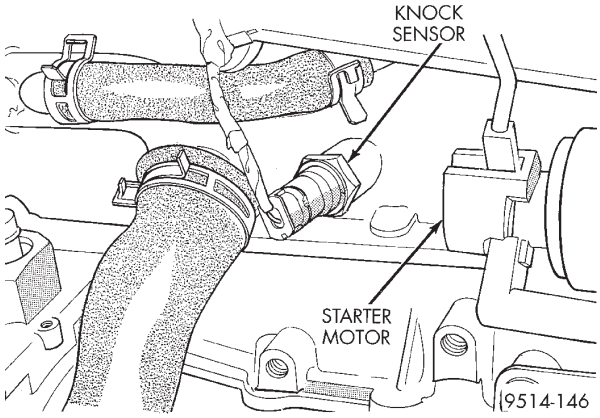
3.2L AND 3.5L



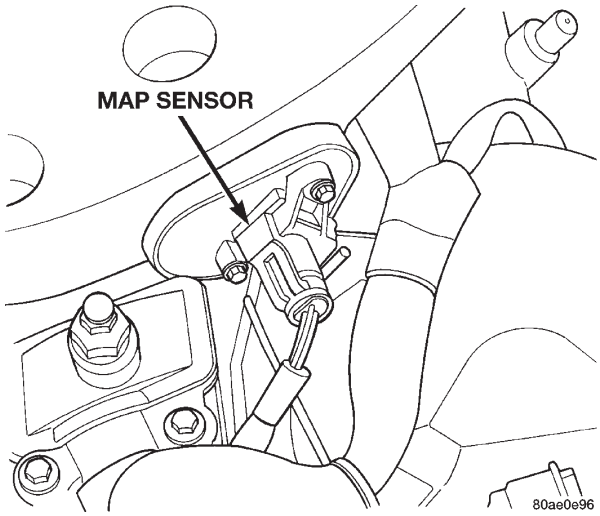
3.2L AND 3.5L



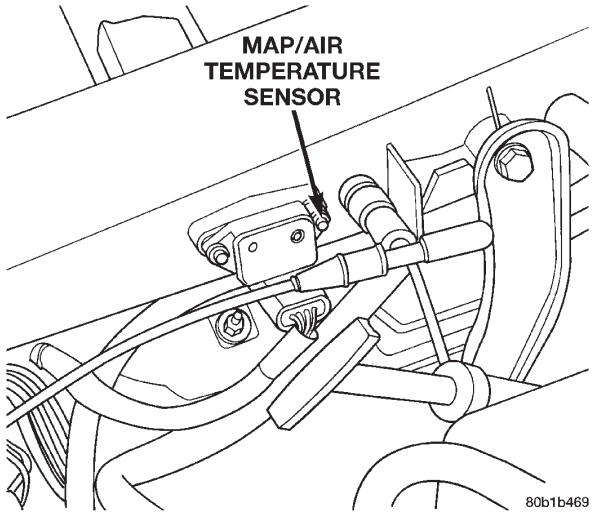
2.7L



2.7L

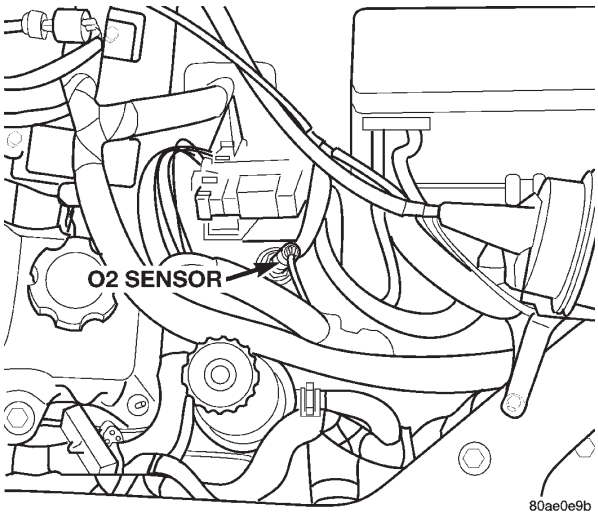


3.2L AND 3.5L

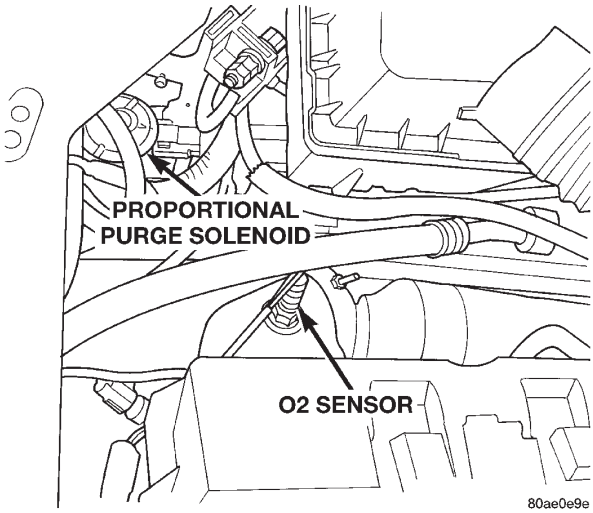


8.4 SENSORS (Continued)

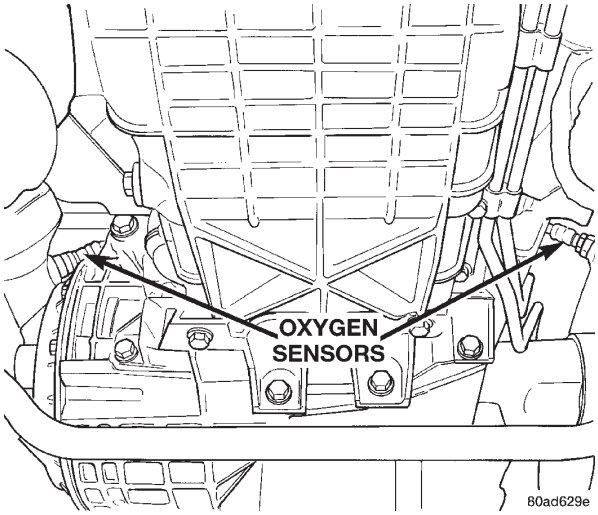
1/1

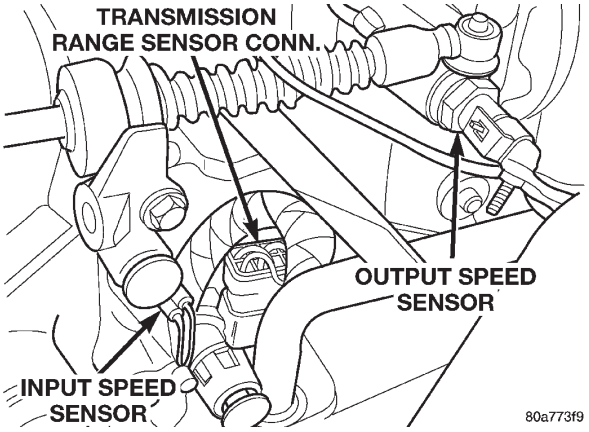


2/1

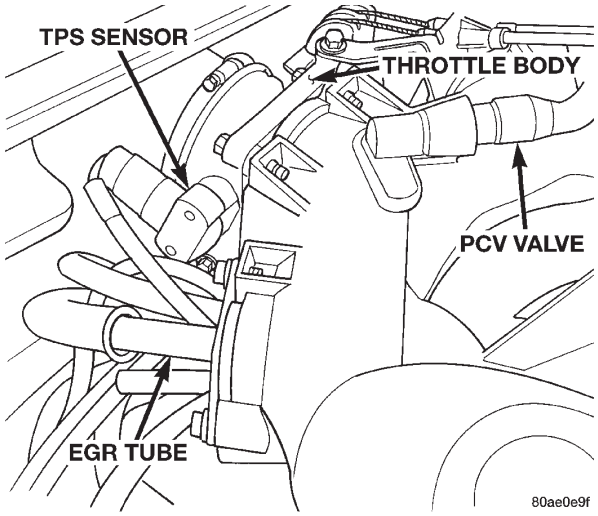


1/2 AND 2/2

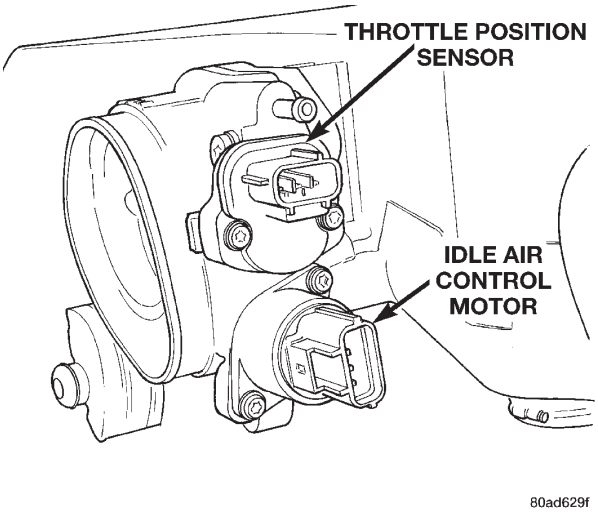


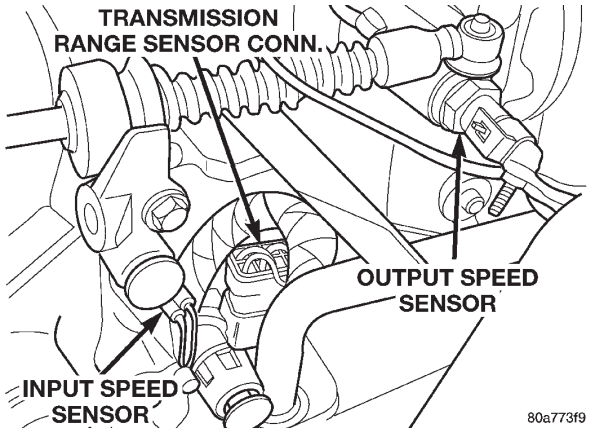


2.7L

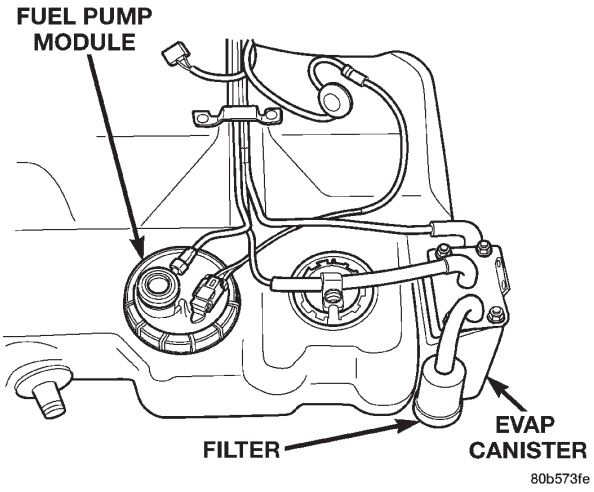


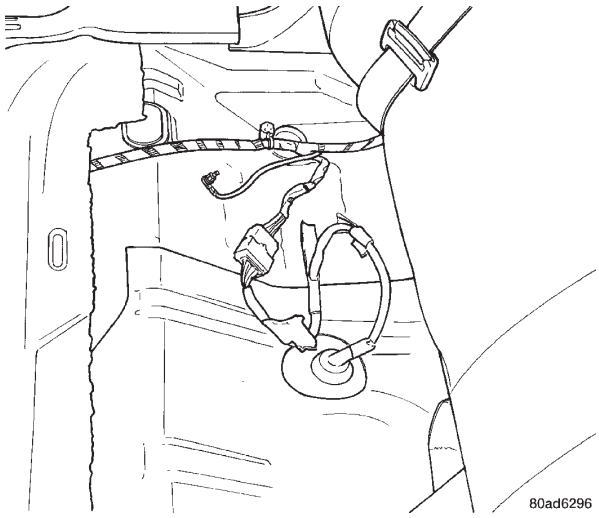
3.2L AND 3.5L



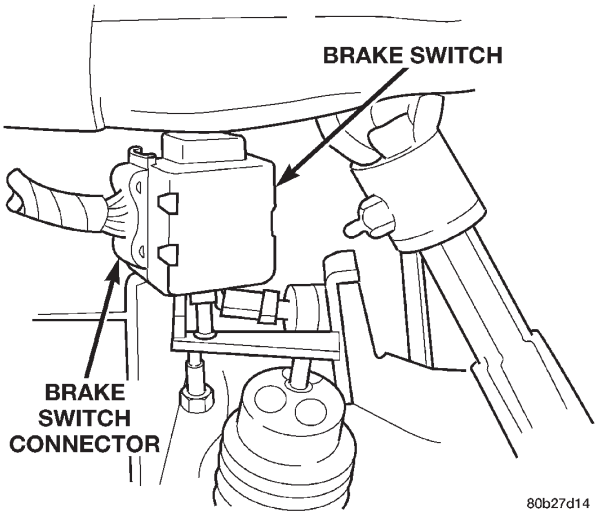


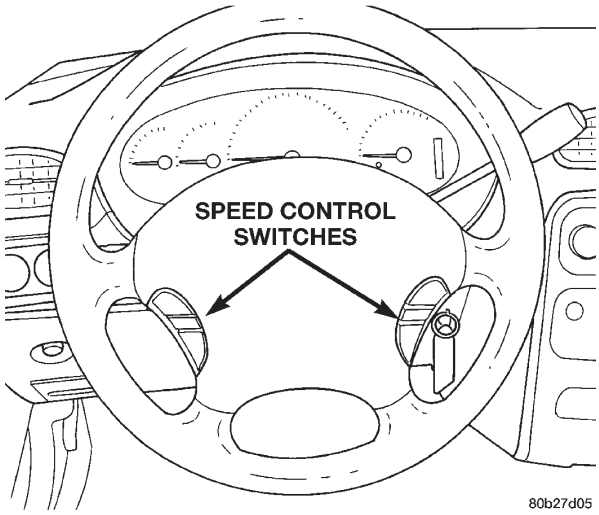
8.5 FUEL SYSTEM





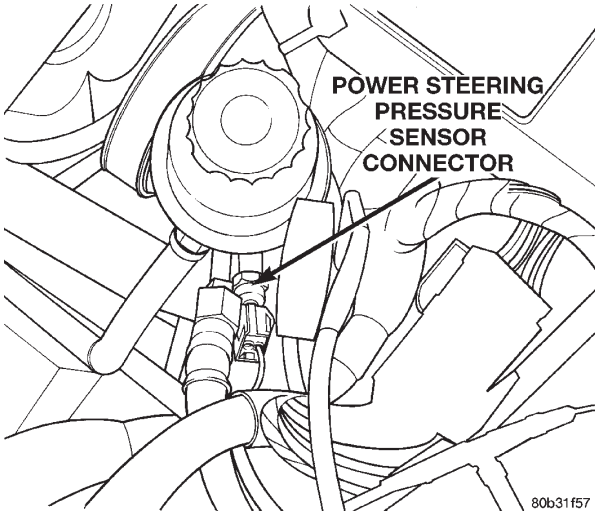
8.7 SWITCHES



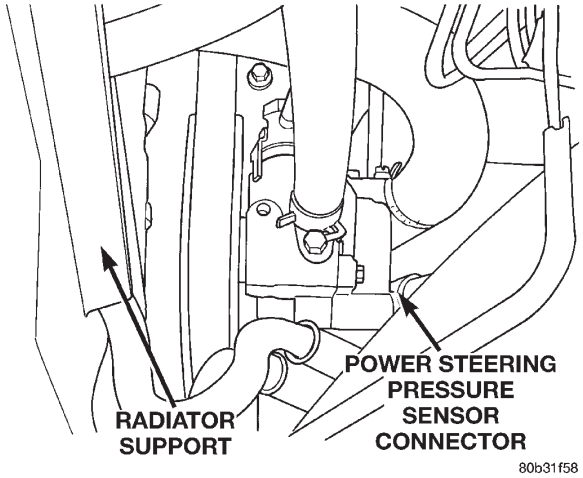


8.7 SWITCHES (Continued)

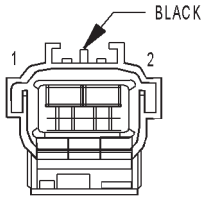
2.7L



3.2L AND 3.5L



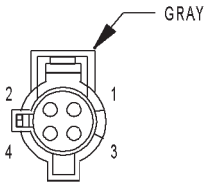
9.0 CONNECTOR PINOUTS



A/C COMPRESSOR CLUTCH

A/C COMPRESSOR CLUTCH - BLACK 2 WAY

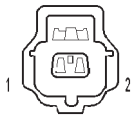
CAV	CIRCUIT	FUNCTION
1	C2 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	Z1 14BK	GROUND



A/C PRESSURE TRANSDUCER

A/C PRESSURE TRANSDUCER - GRAY 4 WAY

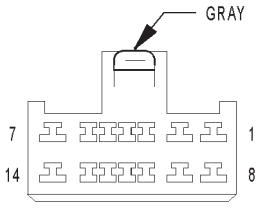
CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K6 20VT/WT	5V SUPPLY
3	C18 20DB	A/C PRESSURE SIGNAL
4	-	-



AMBIENT TEMPERATURE SENSOR

AMBIENT TEMPERATURE SENSOR - 2 WAY

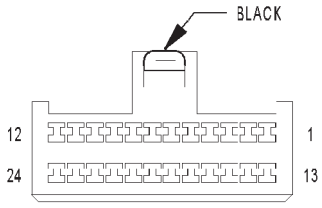
CAV	CIRCUIT	FUNCTION
1	G31 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	C57 20DB/GY	SENSOR GROUND



BODY CONTROL MODULE - C1

BODY CONTROL MODULE C1 - GRAY 14 WAY

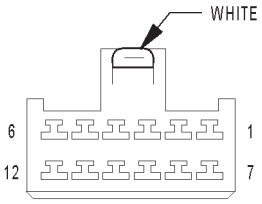
CAV	CIRCUIT	FUNCTION
1	P1 20BK/WT	DECKLID RELEASE SWITCH OUTPUT
2	C32 22GY/DB	RECIRCULATION DOOR DRIVER
3	C33 22DB/RD	BLEND AIR DOOR DRIVER
4	D25 20VT/YL	PCI BUS (ATC)
5	D25 20VT/YL	PCI BUS (RADIO)
6	-	-
7	D25 18VT/YL	PCI BUS (ORC)
8	C57 20DB/GY	SENSOR GROUND
9	C35 22DG/YL	MODE DOOR DRIVER
10	C34 22BR/WT	COMMON DOOR DRIVER
11	C59 20VT/LG	FAN OFF SWITCH SIGNAL
12	D25 20VT/YL	PCI BUS (SKIM)
13	D25 20VT/YL	PCI BUS (MIC)
14	D25 20VT/YL	PCI BUS (DLC)



BODY CONTROL MODULE - C2

BODY CONTROL MODULE C2 - BLACK 24 WAY

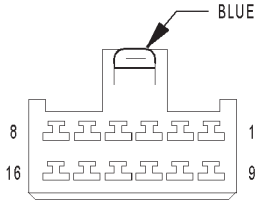
CAV	CIRCUIT	FUNCTION
1	C36 22RD/WT	BLEND DOOR FEEDBACK SIGNAL
2	G52 20YL	HEADLAMP SWITCH MUX
3	-	-
4	-	-
5	C9 22YL/DG	ASPIRATOR MOTOR DRIVER
6	C56 22RD/LG	BLOWER MOTOR CONTROL
7	V10 20BR	FRONT WASHER PUMP MOTOR CONTROL
8	V52 20DG/RD	FRONT WIPER MUX SWITCH SIGNAL
9	C37 22YL/WT	MODE DOOR FEEDBACK SIGNAL
10	C38 20DB	SUN SENSOR SIGNAL
11	-	-
12	C82 20YL/OR	TEMPERATURE SELECT SIGNAL
13 (MTC)	E17 20YL/BK	DAY BRIGHTNESS SENSE
14	C48 20VT/PK	A/C LED INDICATOR SIGNAL
15	C26 22PK/DB	5V SUPPLY
16	-	-
17	-	-
18	-	-
19	L80 20WT	HEADLAMP SWITCH RETURN
20	C12 22LG/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
21	E19 20RD	PANEL LAMPS DIMMER SIGNAL
22 (ATC)	C10 22RD/TN	IN-CAR TEMPERATURE SENSOR SIGNAL
22 (MTC)	C58 22RD/TN	A/C MODE SWITCH MUX
23	G69 22BK/OR	VTSS INDICATOR DRIVER
24	G26 22LB	KEY-IN IGNITION SWITCH SENSE



BODY CONTROL MODULE - C3

BODY CONTROL MODULE C3 - WHITE 12 WAY

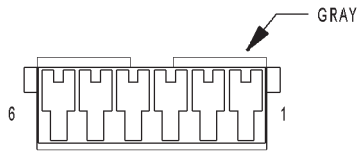
CAV	CIRCUIT	FUNCTION
1	D25 20VT/YL	PCI BUS (MHS/MM)
2	D25 20 VT/YL	PCI BUS (CAB)
3	V55 20TN/RD	WIPER PARK SWITCH SENSE
4	V14 20RD/VT	WIPER ON/OFF RELAY CONTROL
5	G31 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
6	-	-
7	D25 20VT/YL	PCI BUS (TCM)
8	-	-
9	V58 14BR/YL	HEADLAMP WASHER RELAY CONTROL
10	C57 20DB/GY	SENSOR GROUND
11	-	-
12	V16 20VT	WIPER HIGH/LOW RELAY CONTROL



BODY CONTROL MODULE - C4

BODY CONTROL MODULE C4 - BLUE 16 WAY

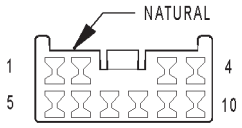
CAV	CIRCUIT	FUNCTION
1	G74 20TN/RD	DOOR AJAR SWITCH SENSE (LR)
2	G74 20TN/RD	DOOR AJAR SWITCH SENSE (PASS)
3	G72 20DG/OR	PASSENGER DOOR KEY CYLINDER SWITCH SENSE
4	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
5	P97 20WT/DG	DRIVER DOOR MUX SWITCH
6	-	-
7	G4 20DB	FUEL LEVEL SENSOR SIGNAL
8	G71 18VT/WT	DECKLID SECURITY SWITCH SENSE
9	D25 20VT/YL	PCI BUS (PCM)
10	G74 20TN/RD	DOOR AJAR SWITCH SENSE (RR)
11	-	-
12	P96 20WT/LG	PASSENGER DOOR MUX SWITCH
13	G73 20LG/OR	DRIVER DOOR KEY CYLINDER SWITCH SENSE
14	C80 20DB/WT	REAR WINDOW DEFOGGER RELAY CONTROL
15	G10 20LG/RD	SEAT BELT SWITCH SENSE
16	-	-



BRAKE LAMP SWITCH

BRAKE LAMP SWITCH - GRAY 6 WAY

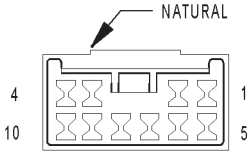
CAV	CIRCUIT	FUNCTION
1	K29 29WT/PK	BRAKE SWITCH SENSE
2	Z2 18BK/LG	GROUND
3	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
6	F32 16PK/DB	FUSED B(+)



C308

C308 - NATURAL (BODY SIDE)

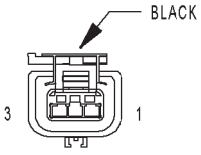
CAV	CIRCUIT
1	-
2	G4 14DB
3	K106 18 WT/DG
4	-
5	-
6	K107 20OR/RD
7	A141 12DG/WT
8	Z1 12BK
9	F18 20LG/BK
10	-



C308

C308 - NATURAL (FUEL TANK JUMPER SIDE)

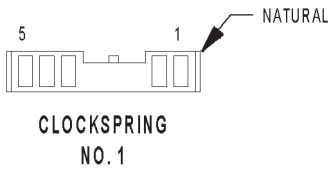
CAV	CIRCUIT
1	-
2	G4 20DB
3	K106 18WT/DG
4	-
5	-
6	K107 20OR/RD
7	A141 12DG/WT
8	Z1 12BK
9	F18 20LG/BK
10	-



CAMSHAFT POSITION SENSOR

CAMSHAFT POSITION SENSOR - BLACK 3 WAY

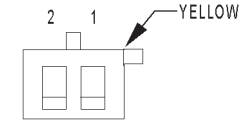
CAV	CIRCUIT	FUNCTION
1	K7 20OR	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K44 20TN/YL	CAMSHAFT POSITION SENSOR



CLOCKSPRING
NO. 1

CLOCKSPRING NO. 1 - NATURAL 5 WAY

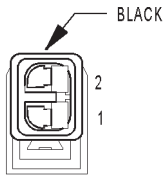
CAV	CIRCUIT	FUNCTION
1	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
2	K4 20BK/LB	SENSOR GROUND
3	X3 16BK/RD	HORN RELAY CONTROL
4	-	-
5	-	-



CLOCKSPRING
NO. 2

CLOCKSPRING NO. 2 - YELLOW 2 WAY

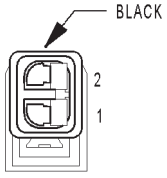
CAV	CIRCUIT	FUNCTION
1	R43 18BK/LB	DRIVER SQUIB NO. 1 LINE 2
2	R45 18DG/LB	DRIVER SQUIB NO. 1 LINE 1



COIL ON
PLUG NO. 1

COIL ON PLUG NO. 1 - BLACK 2 WAY

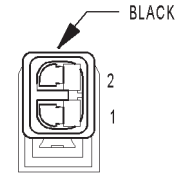
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K91 16TN/RD	COIL DRIVER NO. 1



COIL ON
PLUG NO. 2

COIL ON PLUG NO. 2 - BLACK 2 WAY

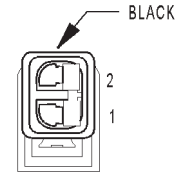
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K92 16TN/PK	COIL DRIVER NO. 2



COIL ON
PLUG NO. 3

COIL ON PLUG NO. 3 - BLACK 2 WAY

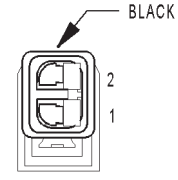
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K93 16TN/OR	COIL DRIVER NO. 3



COIL ON
PLUG NO. 4

COIL ON PLUG NO. 4 - BLACK 2 WAY

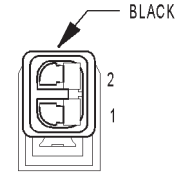
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K94 16TN/LG	COIL DRIVER NO. 4



COIL ON
PLUG NO. 5

COIL ON PLUG NO. 5 - BLACK 2 WAY

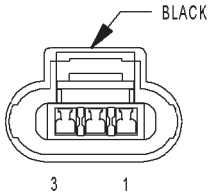
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K95 16TN/DG	COIL DRIVER NO. 5



COIL ON
PLUG NO. 6

COIL ON PLUG NO. 6 - BLACK 2 WAY

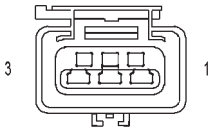
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K96 16TN/LB	COIL DRIVER NO. 6



CRANKSHAFT POSITION SENSOR (2.7L)

CRANKSHAFT POSITION SENSOR (2.7L) - BLACK 3 WAY

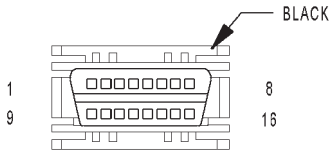
CAV	CIRCUIT	FUNCTION
1	K24 20GY/BK (2.7L)	CRANKSHAFT POSITION SENSOR SIGNAL
1	K7 20OR (3.2L/3.5L)	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K24 20GY/BK (3.2L/3.5L)	CRANKSHAFT POSITION SENSOR SIGNAL
3	K7 20OR (2.7L)	8V SUPPLY



CRANKSHAFT POSITION SENSOR (3.2L/3.5L)

CRANKSHAFT POSITION SENSOR (3.2L/3.5L) - 3 WAY

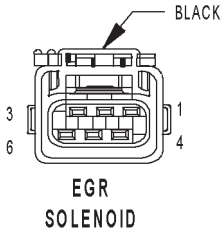
CAV	CIRCUIT	FUNCTION
1	K24 20GY/BK (2.7L)	CRANKSHAFT POSITION SENSOR SIGNAL
1	K7 20OR (3.2L/3.5L)	8V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K24 20GY/BK (3.2L/3.5L)	CRANKSHAFT POSITION SENSOR SIGNAL
3	K7 20OR (2.7L)	8V SUPPLY



DATA LINK CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

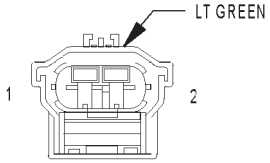
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	Z1 20BK	GROUND
5	Z2 20BK/LG	GROUND
6	D20 20LG	SCI RECEIVE (PCM)
7	D21 20PK/TN	SCI TRANSMIT
8	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (ST-RUN-OFF)
9	-	-
10	-	-
11	-	-
12	-	-
13	-	-
14	D6 20PK/LB	SCI RECEIVE (TCM)
15	-	-
16	M1 20PK	FUSED B (+)



EGR
SOLENOID

EGR SOLENOID - BLACK 6 WAY

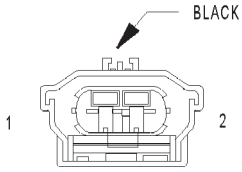
CAV	CIRCUIT	FUNCTION
1	K235 20LG/PK	EGR SENSOR SIGNAL
2	K6 20VT/WT	5V SUPPLY
3	K4 18BK/LB	SENSOR GROUND
4	K35 20GY/YL	EGR SOLENOID CONTROL
5	-	-
6	F142 18OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



ENGINE OIL
PRESSURE SWITCH

ENGINE OIL PRESSURE SWITCH - GREEN 2 WAY

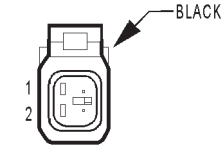
CAV	CIRCUIT	FUNCTION
1	G6 20GY	OIL PRESSURE SWITCH SENSE
2	-	-



EVAP/PURGE
SOLENOID

EVAP/PURGE SOLENOID - BLACK 2 WAY

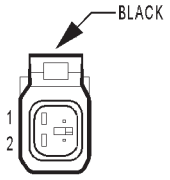
CAV	CIRCUIT	FUNCTION
1	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
2	K108 18DG/LG	EVAPORATIVE SOLENOID SENSE



FUEL
INJECTOR NO. 1

FUEL INJECTOR NO. 1 - BLACK 2 WAY

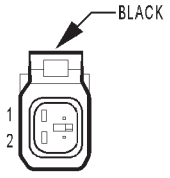
CAV	CIRCUIT	FUNCTION
1	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR NO. 2

FUEL INJECTOR NO. 2 - BLACK 2 WAY

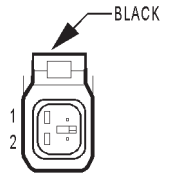
CAV	CIRCUIT	FUNCTION
1	K12 18TN/WT	FUEL INJECTOR NO. 2 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR NO. 3

FUEL INJECTOR NO. 3 - BLACK 2 WAY

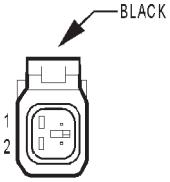
CAV	CIRCUIT	FUNCTION
1	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR NO. 4

FUEL INJECTOR NO. 4 - BLACK 2 WAY

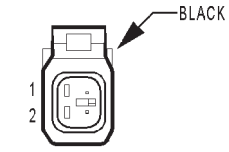
CAV	CIRCUIT	FUNCTION
1	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR NO. 5

FUEL INJECTOR NO. 5 - BLACK 2 WAY

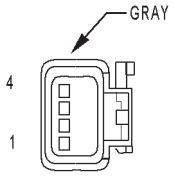
CAV	CIRCUIT	FUNCTION
1	K38 18GY	FUEL INJECTOR NO. 5 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL
INJECTOR NO. 6

FUEL INJECTOR NO. 6 - BLACK 2 WAY

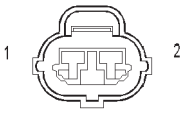
CAV	CIRCUIT	FUNCTION
1	K58 18BR/DB	FUEL INJECTOR NO. 6 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



FUEL PUMP MODULE

FUEL PUMP MODULE - GRAY 4 WAY

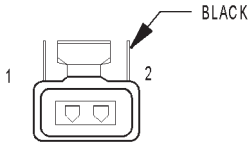
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	Z1 12BK	GROUND
3	G4 12BK	FUEL LEVEL SENSOR
4	A141 12DG/WT	FUEL PUMP RELAY OUTPUT



GENERATOR
(2.7L)

GENERATOR (2.7L) - 2 WAY

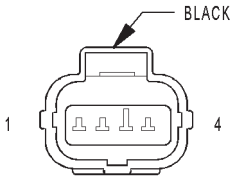
CAV	CIRCUIT	FUNCTION
1	K20 18DG	GENERATOR FIELD DRIVER (+)
2	F142 18OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



GENERATOR
(3.2L/3.5L)

GENERATOR (3.2L/3.5L) - BLACK 2 WAY

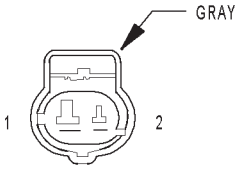
CAV	CIRCUIT	FUNCTION
1	K20 18DG	GENERATOR FIELD DRIVER (+)
2	F142 18OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



IDLE AIR
CONTROL MOTOR

IDLE AIR CONTROL MOTOR - BLACK 4 WAY

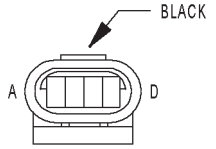
CAV	CIRCUIT	FUNCTION
1	K39 20GY/RD	IDLE AIR CONTROL NO. 1 DRIVER
2	K60 20YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
3	K40 20BR/WT	IDLE AIR CONTROL NO. 3 DRIVER
4	K59 20VT/BK	IDLE AIR CONTROL NO. 4 DRIVER



INTAKE AIR
TEMPERATURE SENSOR
(2.7L)

INTAKE AIR TEMPERATURE SENSOR (2.7L) - GRAY 2 WAY

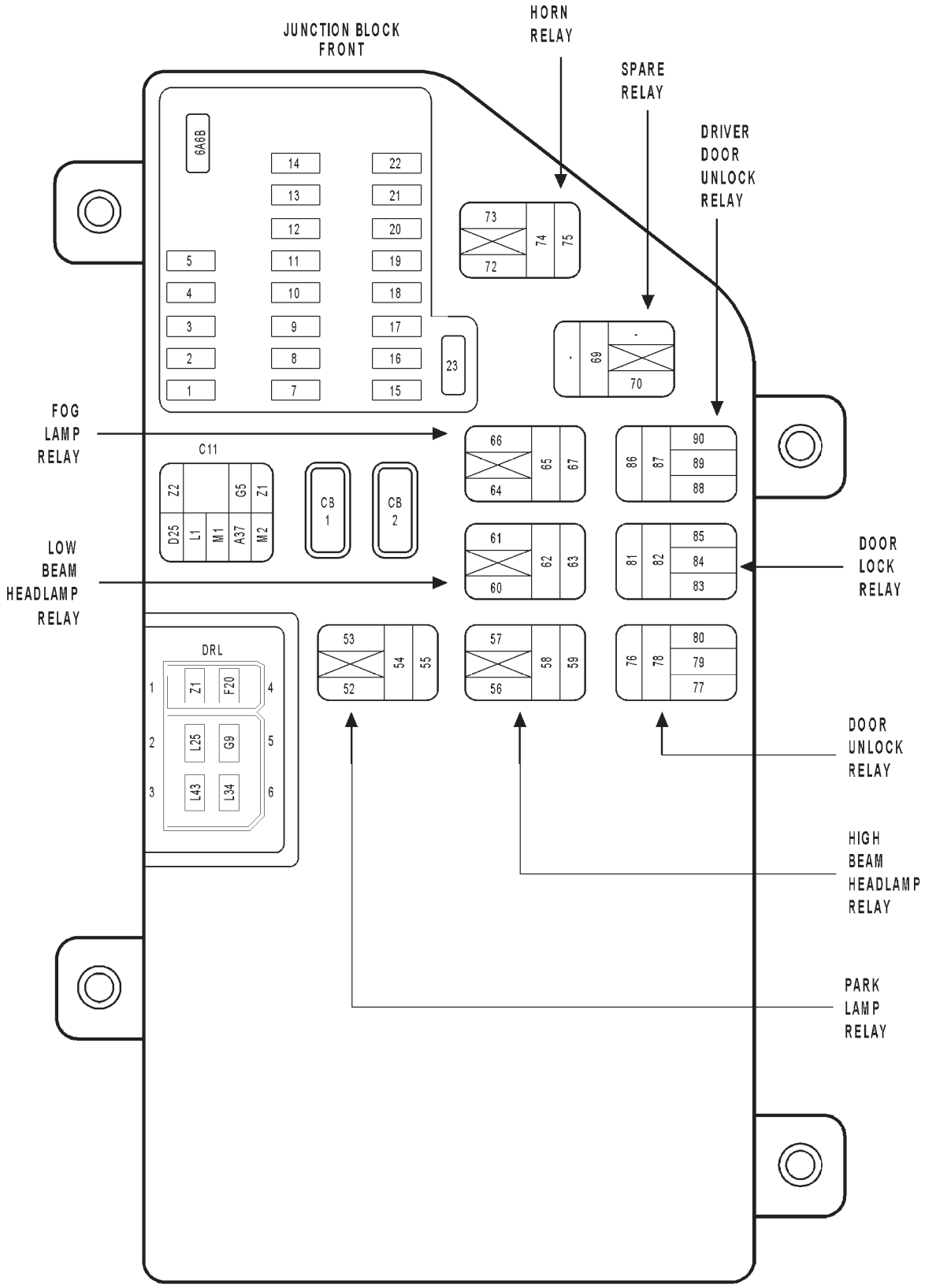
CAV	CIRCUIT	FUNCTION
1	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
2	K4 20BK/LB	SENSOR GROUND



INTAKE AIR
TEMPERATURE/
MANIFOLD ABSOLUTE
PRESSURE SENSOR
(3.2L/3.5L)

INTAKE AIR TEMPERATURE/MANIFOLD ABSOLUTE PRESSURE SENSOR (3.2L/3.5L)

CAV	CIRCUIT	FUNCTION
D	K1 20DG/RD	MAP SENSOR SIGNAL
B	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
A	K4 18BK/LB	SENSOR GROUND
C	K6 20VT/WT	5V SUPPLY


JUNCTION BLOCK
FRONT
HORN
RELAY
SPARE
RELAY
DRIVER
DOOR
UNLOCK
RELAY
6A6B
14
13
12
11
10
9
8
7
22
21
20
19
18
17
16
15
5
4
3
2
1
23
73
74
75
72
69
70
FOG
LAMP
RELAY
C11
Z2
G5
Z1
D25
L1
M1
A37
M2
CB
1
CB
2
66
65
67
64
86
87
90
89
88
LOW
BEAM
HEADLAMP
RELAY
61
62
63
60
81
82
85
84
83
DOOR
LOCK
RELAY
DRL
1
2
3
4
5
6
Z1
F20
L25
G9
L43
L34
53
54
55
52
57
58
59
56
76
78
80
79
77
DOOR
UNLOCK
RELAY
HIGH
BEAM
HEADLAMP
RELAY
PARK
LAMP
RELAY

FUSES

CAV	CIRCUIT	FUNCTION
1	INTERNAL	IGNITION SWITCH OUTPUT (ST-RUN-OFF)
2	INTERNAL	INTERNAL
3	L33 20RD	FUSED B(+)
4	X12 20RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
5	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
6 (IGNITION POSITION)	F30 18RD	FUSED B(+)
6 (BATTERY POSITION)	F30 18RD	FUSED B(+)
7	INTERNAL	INTERNAL
8	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
9	L5 22BK/YL	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
10	L44 20VT/RD	FUSED RIGHT LOW BEAM OUTPUT
11	L40 20BR/WT	FUSED LOW BEAM RELAY OUTPUT
12	INTERNAL	INTERNAL
13	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (ST-RUN)
14	INTERNAL	INTERNAL
15	INTERNAL	INTERNAL
16	INTERNAL	INTERNAL
17	INTERNAL	INTERNAL
18	INTERNAL	INTERNAL
19	INTERNAL	INTERNAL
20	F32 16PK/DB	FUSED B(+)
21	INTERNAL	INTERNAL
22	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (ST-RUN)
23	C1 12DG	FUSED IGNITION SWITCH OUTPUT (RUN)

CIRCUIT BREAKERS

CAV	CIRCUIT	FUNCTION
1	F21 14TN	INTERNAL
2	INTERNAL	INTERNAL

DAYTIME RUNNING LAMP MODULE

CAV	CIRCUIT	FUNCTION
1	Z1 14BK	GROUND
2	INTERNAL	FUSED B(+)
3	INTERNAL	LOW BEAM RELAY OUTPUT
4	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
5	G9 20GY/BK	PARK BRAKE SENSE
6	INTERNAL	FUSED HIGH BEAM RELAY OUTPUT

DOOR LOCK RELAY

CAV	CIRCUIT	FUNCTION
81	INTERNAL	LOCK RELAY OUTPUT
82	INTERNAL	FUSED B(+)
83	INTERNAL	FUSED B(+)
84	INTERNAL	GROUND
85	INTERNAL	DOOR LOCK RELAY CONTROL

DOOR UNLOCK RELAY

CAV	CIRCUIT	FUNCTION
76	INTERNAL	UNLOCK RELAY OUTPUT
77	INTERNAL	FUSED B(+)
78	INTERNAL	FUSED B(+)
79	INTERNAL	GROUND
80	INTERNAL	DOOR UNLOCK RELAY CONTROL

DRIVER DOOR UNLOCK RELAY

CAV	CIRCUIT	FUNCTION
86	P55 16DB	DRIVER DOOR UNLOCK RELAY OUTPUT
87	INTERNAL	FUSED B(+)
88	INTERNAL	FUSED B(+)
89	INTERNAL	GROUND
90	INTERNAL	DRIVER DOOR UNLOCK RELAY CONTROL

FOG LAMP RELAY

CAV	CIRCUIT	FUNCTION
-	-	-
64	INTERNAL	FOG LAMP RELAY CONTROL
65	INTERNAL	FUSED B(+)
66	INTERNAL	FUSED B(+)
67	INTERNAL	FOG LAMP RELAY OUTPUT

HIGH BEAM HEADLAMP RELAY

CAV	CIRCUIT	FUNCTION
-	-	-
56	INTERNAL	GROUND
57	INTERNAL	HIGH BEAM RELAY CONTROL
58	INTERNAL	FUSED B(+)
59	INTERNAL	HIGH BEAM HEADLAMP RELAY OUTPUT

HORN RELAY

CAV	CIRCUIT	FUNCTION
-	-	-
72	INTERNAL	HORN RELAY CONTROL
73	INTERNAL	FUSED B(+)
74	INTERNAL	FUSED B(+)
75	X2 18DG/RD	HORN RELAY OUTPUT

LOW BEAM HEADLAMP RELAY

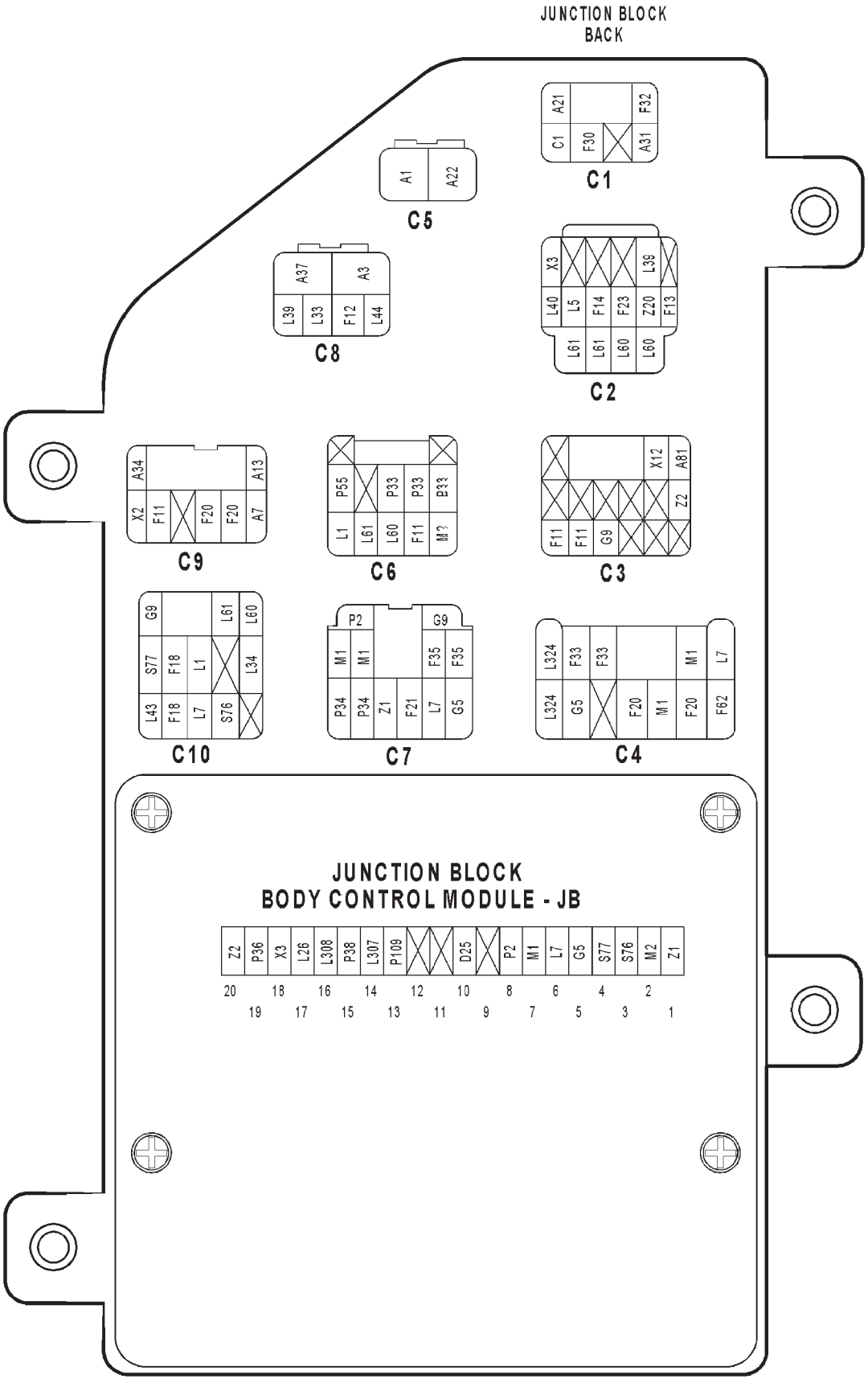
CAV	CIRCUIT	FUNCTION
-	-	-
60	INTERNAL	LOW BEAM HEADLAMP RELAY CONTROL
61	INTERNAL	FUSED B(+)
62	INTERNAL	FUSED B(+)
63	INTERNAL	LOW BEAM HEADLAMP RELAY OUTPUT

PARK LAMP RELAY

CAV	CIRCUIT	FUNCTION
-	-	-
52	INTERNAL	PARK LAMP RELAY CONTROL
53	INTERNAL	FUSED B(+)
54	INTERNAL	FUSED B(+)
55	INTERNAL	PARK LAMP RELAY OUTPUT

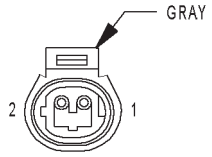
SPARE RELAY

CAV	CIRCUIT	FUNCTION
-	-	-
68	-	-
69	A37 16WT/DB	FUSED B(+)
70	A37 16WT/DB	FUSED B(+)
71	-	-


JUNCTION BLOCK
BACK
C1
A21
C1
F30
F32
A31
C5
A1
A22
C8
A37
A3
L39
L33
F12
L44
C2
X3
L39
L40
L5
F14
F23
Z20
F13
L61
L61
L60
L60
C9
A34
A13
X2
F11
F20
F20
A7
C6
P55
P33
P33
L1
L61
L60
F11
C3
X12
A81
Z2
F11
F11
G9
C10
G9
L61
L60
S77
F18
L1
L34
L43
F18
L7
S76
C7
P2
G9
M1
M1
F35
F35
P34
P34
Z1
F21
L7
G5
C4
L324
F33
F33
M1
L7
L324
G5
F20
M1
F20
F62
JUNCTION BLOCK
BODY CONTROL MODULE - JB
Z2
P36
X3
L26
L308
P38
L307
P109
D25
P2
M1
L7
G5
S77
S76
M2
Z1
20
18
16
14
12
10
8
6
4
2
19
17
15
13
11
9
7
5
3
1

JUNCTION BLOCK BODY CONTROL MODULE - JB

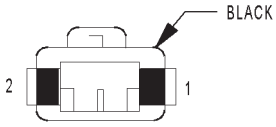
CAV	CIRCUIT	FUNCTION
1	Z1	GROUND
2	M2	COURTESY LAMP DRIVER
3	S76	SPEED PROPORTIONAL STEERING SOLENOID (-)
4	S77	SPEED PROPORTIONAL STEERING SOLENOID (+)
5	G5	FUSED IGNITION SWITCH OUTPUT (ST-RUN)
6	L7	PARK LAMP RELAY OUTPUT
7	M1	FUSED(+)
8	P2	DECKLID RELEASE CONTROL
9	-	-
10	D25	PCI BUS (OTIS)
11	-	-
12	-	-
13	P109	DRIVER FRONT DOOR UNLOCK RELAY CONTROL
14	L307	LOW BEAM RELAY CONTROL
15	P38	DOOR LOCK RELAY CONTROL
16	L308	PARK LAMP RELAY CONTROL
17	L26	FOG LAMP RELAY CONTROL
18	X3	HORN RELAY CONTROL
19	P36	DOOR UNLOCK RELAY CONTROL
20	Z2	GROUND



KNOCK SENSOR
(2.7L)

KNOCK SENSOR (2.7L) - GRAY 2 WAY

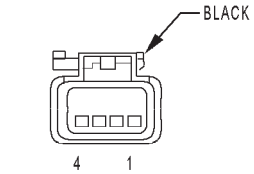
CAV	CIRCUIT	FUNCTION
1	K4 18BK/LB	SENSOR GROUND
2	K45 18BK/VT	KNOCK SENSOR RETURN



KNOCK SENSOR
(3.2L/3.5L)

KNOCK SENSOR (3.2L/3.5L) - BLACK 2 WAY

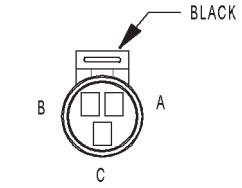
CAV	CIRCUIT	FUNCTION
1	K45 20BK/VT	KNOCK SENSOR RETURN
2	K42 20DB/LG	KNOCK SENSOR SIGNAL



LEAK DETECTION PUMP

LEAK DETECTION PUMP - BLACK 4 WAY

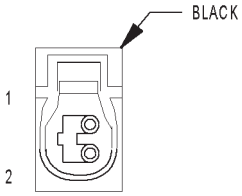
CAV	CIRCUIT	FUNCTION
1	-	-
2	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (ST-RUN)
3	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
4	K107 20OR/RD	LEAK DETECTION PUMP SWITCH SENSE



MANIFOLD ABSOLUTE PRESSURE SENSOR (2.7L)

MANIFOLD ABSOLUTE PRESSURE SENSOR (2.7L) - BLACK 3 WAY

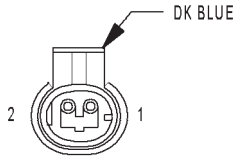
CAV	CIRCUIT	FUNCTION
C	K1 20DG/RD	MAP SENSOR SIGNAL
A	K4 18BK/LB	SENSOR GROUND
B	K6 20VT/WT	5V SUPPLY



MANIFOLD TUNING VALVE

MANIFOLD TUNING VALVE - BLACK 2 WAY

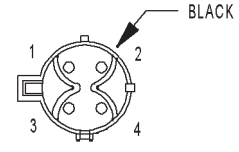
CAV	CIRCUIT	FUNCTION
1	K36 18VT/RD	MANIFOLD SOLENOID CONTROL
2	F42 18DG/LG	AUTOMATIC SHUT DOWN RELAY OUTPUT



OUTPUT SPEED SENSOR

OUTPUT SPEED SENSOR - DK BLUE 2 WAY

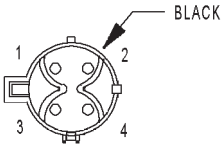
CAV	CIRCUIT	FUNCTION
1	T13 20DB/BK	SPEED SENSOR GROUND
2	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL



OXYGEN SENSOR 1/1 RIGHT BANK UP

OXYGEN SENSOR 1/1 RIGHT BANK UP - BLACK 4 WAY

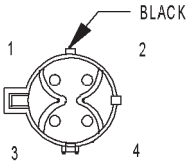
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K127 18BK/OR	OXYGEN SENSOR GROUND
4	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL



OXYGEN SENSOR
1/2 RIGHT BANK
DOWN

OXYGEN SENSOR 1/2 RIGHT BANK DOWN - BLACK 4 WAY

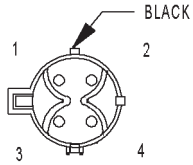
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K4 18BK/LB	SENSOR GROUND
4	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL



OXYGEN SENSOR
2/1 LEFT
BANK UP

OXYGEN SENSOR 2/1 LEFT BANK UP - BLACK 4 WAY

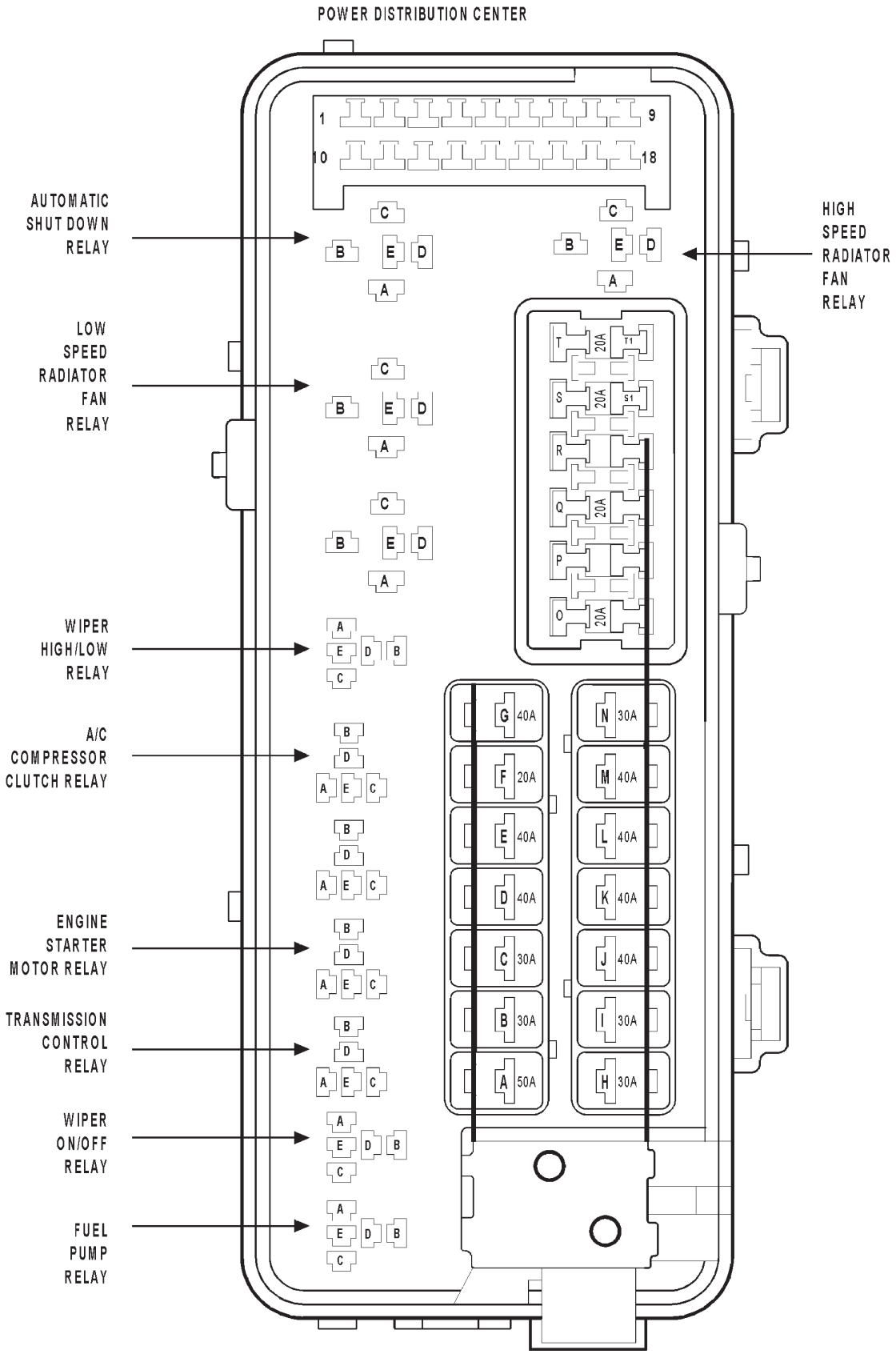
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K127 18BK/OR	OXYGEN SENSOR GROUND
4	K241 20LG/RD	OXYGEN SENSOR 2/1 SIGNAL



OXYGEN SENSOR
2/2 LEFT
BANK DOWN

OXYGEN SENSOR 2/2 LEFT BANK DOWN - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	F142 18OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
3	K4 18BK/LB	SENSOR GROUND
4	K341 20PK/WT	OXYGEN SENSOR 2/2 SIGNAL


POWER DISTRIBUTION CENTER
1
9
10
18
AUTOMATIC SHUT DOWN RELAY
HIGH SPEED RADIATOR FAN RELAY
LOW SPEED RADIATOR FAN RELAY
WIPER HIGH/LOW RELAY
A/C COMPRESSOR CLUTCH RELAY
ENGINE STARTER MOTOR RELAY
TRANSMISSION CONTROL RELAY
WIPER ON/OFF RELAY
FUEL PUMP RELAY
T 20A T1
S 20A S1
R
Q 20A
P
O 20A
G 40A
F 20A
E 40A
D 40A
C 30A
B 30A
A 50A
N 30A
M 40A
L 40A
K 40A
J 40A
I 30A
H 30A

FUSES

CAV	CIRCUIT	FUNCTION
R	-	-
P	-	-
G	A1 12RD	FUSED B(+)
K (ABS)	A10 12RD/DG	FUSED B(+)
L	A13 12PK/WT	FUSED B(+)
N	A14 14RD/WT	FUSED B(+)
O	A15 18PK	FUSED B(+)
E	A16 12GY	FUSED B(+)
B	A17 14RD/BR	FUSED B(+)
J	A2 12PK/BK	FUSED B(+)
H (ABS)	A20 12RD/DB	FUSED B(+)
C	A3 14RD/TN	FUSED B(+)
Q	A30 18RD/LB	FUSED B(+)
D	A34 12LB/RD	FUSED B(+)
F	A37 16WT/DB	FUSED B(+)
A	A4 10BK/PK	FUSED B(+)
M	A5 12RD/OR	FUSED B(+)
I	A7 14RD/BK	FUSED B(+)
T	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
S	F42 16DG/LG	AUTOMATIC SHUT DOWN RELAY OUTPUT

A/C COMPRESSOR CLUTCH RELAY

CAV	CIRCUIT	FUNCTION
E	-	-
B	A17 14RD/BR	FUSED B(+)
D	C2 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
C	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (ST-RUN)

AUTOMATIC SHUT DOWN RELAY

CAV	CIRCUIT	FUNCTION
E	-	-
B	A14 14RD/WT	FUSED B(+)
A	A14 14RD/WT	FUSED B(+)
D	A142 14DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
C	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL

ENGINE STARTER MOTOR RELAY

CAV	CIRCUIT	FUNCTION
E	-	-
B	A1 12RD	FUSED B(+)
A	A41 14YL	FUSED IGNITION SWITCH OUTPUT (START)
C	K90 20TN	STARTER RELAY CONTROL
D	T40 12BR	STARTER RELAY OUTPUT

FUEL PUMP RELAY

CAV	CIRCUIT	FUNCTION
E	-	-
B	A1 12RD	FUSED B(+)
D	A141 12DG/WT	FUEL PUMP RELAY OUTPUT
A	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (ST-RUN)
C	K31 20BR	FUEL PUMP RELAY CONTROL

HEADLAMP WASHER RELAY (BUILT-UP-EXPORT)

CAV	CIRCUIT	FUNCTION
A	V58 20BR/YL	HEADLAMP WASHER RELAY CONTROL
B	A53 14RD/YL	FUSED B(+)
C	A53 14RD/YL	FUSED B(+)
D	V53 14RD/OR	WASHER RELAY OUTPUT
E	-	-

HIGH SPEED RADIATOR FAN RELAY

CAV	CIRCUIT	FUNCTION
E	-	-
B	A17 14RD/BR	FUSED B(+)
D	C25 14YL	HIGH SPEED RADIATOR RELAY OUTPUT
C	C27 20DB/LG	HIGH SPEED RADIATOR FAN RELAY CONTROL
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (ST-RUN)

LOW SPEED RADIATOR FAN RELAY

CAV	CIRCUIT	FUNCTION
E	-	-
B	A16 12GY	FUSED B(+)
D	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
C	C24 20DB/PK	LOW SPEED RADIATOR FAN RELAY CONTROL
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (ST-RUN)

REAR FOG LAMP RELAY (BUILT-UP-EXPORT)

CAV	CIRCUIT	FUNCTION
A	A35 18DB	FUSED B(+)
B	A35 18DB	FUSED B(+)
C	L96 18LG/RD	REAR FOG LAMP SWITCH GROUND
D	L95 18DG/YL	FOG LAMP RELAY OUTPUT
E	-	-

TRANSMISSION CONTROL RELAY

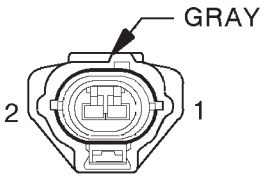
CAV	CIRCUIT	FUNCTION
E	-	-
B	A30 18RD/LB	FUSED B(+)
A	T15 20LG	TRANSMISSION RELAY CONTROL
D	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
C	Z1 20BK	GROUND

WIPER HIGH/LOW RELAY

CAV	CIRCUIT	FUNCTION
A	A5 14RD/OR	FUSED B(+)
C	V16 20VT	WIPER HIGH/LOW RELAY CONTROL
E	V3 14BR/WT	-
D	V4 14RD/YL	WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
B	V5 12DG	WIPER RELAY COMMON

WIPER ON/OFF RELAY

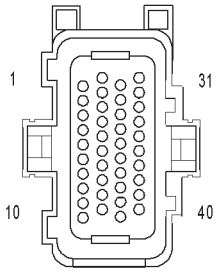
CAV	CIRCUIT	FUNCTION
D	A5 12RD/OR	FUSED B(+)
A	A5 14RD/OR	FUSED B(+)
C	V14 20RD/VT	WIPER ON/OFF RELAY CONTROL
B	V5 12DG	WIPER RELAY COMMON
E	Z1 14BK	GROUND



POWER STEERING
PRESSURE SWITCH

POWER STEERING PRESSURE SWITCH - GRAY 2 WAY

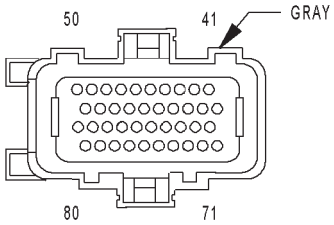
CAV	CIRCUIT	FUNCTION
1	-	-
2	K10 18DB/LG	POWER STEERING PRESSURE SWITCH (PSPS) SIGNAL



POWERTRAIN
CONTROL
MODULE - C1

POWERTRAIN CONTROL MODULE C1 - 40 WAY

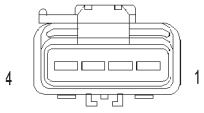
CAV	CIRCUIT	FUNCTION
1	K94 16TN/LG	COIL DRIVER NO. 4
2	K93 16TN/OR	COIL DRIVER NO. 3
3	K92 16TN/PK	COIL DRIVER NO. 2
4	K96 16TN/LB	COIL DRIVER NO. 6
5	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
6	A142 14DG.OR	AUTOMATIC SHUT DOWN RELAY OUTPUT SENSE
7	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
8	K20 18DG	GENERATOR FIELD DRIVER
9	-	-
10	Z12 14BK/TN	GROUND
11	K91 16TN/RD	COIL DRIVER NO. 1
12	-	-
13	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
14	K58 18BR/DB	FUEL INJECTOR NO. 6 DRIVER
15	K38 18GY	FUEL INJECTOR NO. 5 DRIVER
16	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
17	K12 18TN (3.2L/3.5L)	FUEL INJECTOR NO. 2 DRIVER
17	K12 18TN/WT (2.7L)	FUEL INJECTOR NO. 2 DRIVER
18	K236 18GY/PK (3.2L/3.5L)	SHORT RUNNER VALVE SOLENOID CONTROL
19	-	-
20	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (ST-RUN)
21	K95 16TN/DG	COIL DRIVER NO. 5
22	-	-
23	-	-
24	K42 20DB/LG (3.2L/3.5L)	KNOCK SENSOR SIGNAL
25	K45 18BK/VT (2.7L)	KNOCK SENSOR SIGNAL
25	K45 20BK/VT (3.2L/3.5L)	KNOCK SENSOR RETURN
26	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
27	K127 18BK/OR	OXYGEN SENSOR GROUND
28	-	-
29	K241 20LG/RD	OXYGEN SENSOR 2/1 SIGNAL
30	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
31	K90 20TN (2.7L)	STARTER RELAY CONTROL
31	K90 20TN/WT (3.2L/3.5L)	STARTER RELAY CONTROL
32	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
33	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
34	K235 20LG/PK	EGR SENSOR SIGNAL
35	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
36	K1 20DG/RD	MAP SENSOR SIGNAL
37	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
38	-	-
39	K36 18VT/RD	MANIFOLD SOLENOID CONTROL
40	K35 20GY/YL	EGR SOLENOID CONTROL



POWERTRAIN CONTROL MODULE - C2

POWERTRAIN CONTROL MODULE C2 - GRAY 40 WAY

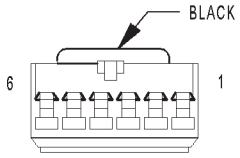
CAV	CIRCUIT	FUNCTION
41	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
42	C18 20DB	A/C PRESSURE SIGNAL
43	K4 18BK/LB	SENSOR GROUND
44	K7 20OR	8V SUPPLY
45	K10 18DB/LG	POWER STEERING PRESSURE SWITCH SENSE
46	A14 14RD/WT	FUSED B(+)
47	Z11 14BK/WT	GROUND
48	K40 20BR/WT	IDLE AIR CONTROL NO. 3 DRIVER
49	K60 20YL/BK	IDLE AIR CONTROL NO. 2 DRIVER
50	Z12 14BK/TN	GROUND
51	K141 20TN/WT	OXYGEN 1/2 SIGNAL
52	-	-
53	K341 20PK/WT	OXYGEN SENSOR 2/2 SIGNAL
54	-	-
55	C24 20DB/PK	LOW SPEED RADIATOR FAN RELAY CONTROL
56	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
57	K39 20GY/RD	IDLE AIR CONTROL NO. 1 DRIVER
58	K59 20VT/BK	IDLE AIR CONTROL NO. 4 DRIVER
59	D25 20VT/YL	PCI BUS
60	-	-
61	K6 20VT/WT	5V SUPPLY
62	K29 20WT/PK	BRAKE SWITCH SENSE
63	T10 20YL/DG	TORQUE MANAGEMENT REQUEST SENSE
64	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
65	D21 20PK/TN	SCI TRANSMIT
66	G7 20WT/OR	VEHICLE SPEED SENSOR SIGNAL
67	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
68	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
69	C27 20DB/LG	HIGH SPEED RADIATOR FAN RELAY CONTROL
70	K108 18DG/LG	EVAPORATIVE EMISSION SOLENOID SENSE
71	K71 20WT/RD	EATX RPM SIGNAL
72	K107 18OR/RD	LEAK DETECTION PUMP SWITCH SENSE
73	-	-
74	K31 20BR	FUEL PUMP RELAY CONTROL
75	D20 20LG	SCI RECEIVE
76	T41 20BR/YL	TRS T41 SENSE
77	K106 18WT/DG	LEAK DETECTION PUMP SOLENOID CONTROL
78	-	-
79	-	-
80	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL



RADIATOR FAN MOTOR ASSEMBLY

RADIATOR FAN MOTOR ASSEMBLY - 4 WAY

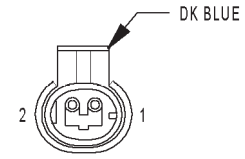
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	Z1 12BK	GROUND
3	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
4	C25 14YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT



SENTRY KEY IMMOBILIZER MODULE

SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY

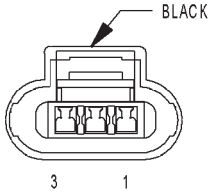
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (ST-RUN)
5	Z2 20BK/LG	GROUND
6	M1 20PK	FUSED B(+)



SHORT RUNNER VALVE SOLENOID (3.2L/3.5L)

SHORT RUNNER VALVE SOLENOID (3.2L/3.5L) - DK BLUE 2 WAY

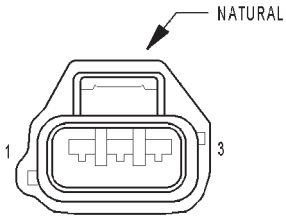
CAV	CIRCUIT	FUNCTION
1	K236 18GY/PK	SHORT RUNNER VALVE SOLENOID CONTROL
2	F142 18OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



THROTTLE POSITION SENSOR (2.7L)

THROTTLE POSITION SENSOR (2.7L) - BLACK 3 WAY

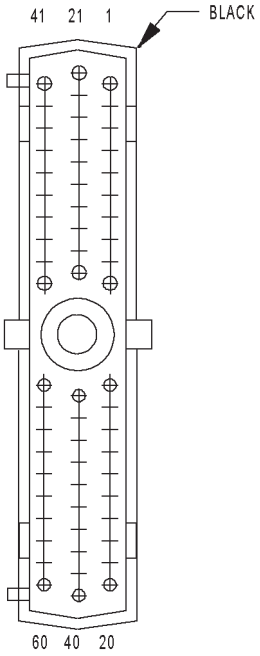
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K2 2OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



THROTTLE POSITION SENSOR (3.2L/3.5L)

THROTTLE POSITION SENSOR (3.2L/3.5L) - NATURAL 3 WAY

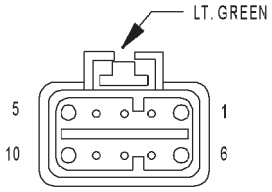
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND



TRANSMISSION CONTROL MODULE

TRANSMISSION CONTROL MODULE - BLACK 60 WAY

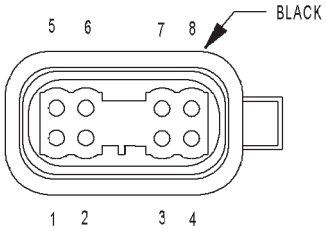
CAV	CIRCUIT	FUNCTION
1	T1 20LG/BK	TRS T1 SENSE
2	-	-
3	T3 20VT	TRS T3 SENSE
4	-	-
5	T5 20LG/RD	AUTOSTICK UPSHIFT SWITCH SENSE
6	K71 20WT/RD	EATX RPM SIGNAL
7	D21 20PK/TN	SCI TRANSMIT
8	A41 14YL	FUSED IGNITION SWITCH OUTPUT (ST)
9	T9 16OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
10	T10 20YL/DG	TORQUE MANAGEMENT REQUEST SENSE
11	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (ST-RUN-OFF)
12	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
13	T13 20DB/BK	SPEED SENSOR GROUND
14	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL
15	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
16	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
17	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
18	-	-
19	T19 16WT	2-4 SOLENOID CONTROL
20	T20 16LB	LOW/REVERSE SOLENOID CONTROL
21	-	-
22	-	-
23	-	-
24	-	-
25	-	-
26	-	-
27	-	-
28	-	-
29	-	-
30	-	-
31	-	-
32	-	-
33	-	-
34	-	-
35	-	-
36	-	-
37	-	-
38	-	-
39	-	-
40	-	-
41	T41 20BR/YL	TRS T41 SENSE
42	T42 20VT/WT	TRS T42 SENSE
43	D25 20VT/YL	PCI BUS
44	T44 20YL/LB	AUTOSTICK DOWNSHIFT SWITCH SENSE
45	-	-
46	D6 20PK/LB	SCI RECEIVE
47	T47 16YL/BK	2-4 PRESSURE SWITCH SENSE
48	-	-
49	-	-
50	T50 18DG	LOW/REVERSE PRESSURE SWITCH SENSE
51	K4 20BK/LB	SENSOR GROUND
52	T52 20RD/BK	INPUT SPEED SENSOR SIGNAL
53	Z14 16BK/YL	GROUND
54	T54 20VT/PK	TRANSMISSION TEMPERATURE SENSOR SIGNAL
55	-	-
56	A30 18RD/LB	FUSED B(+)
57	Z13 16BK/RD	GROUND
58	G7 20WT/OR	VEHICLE SPEED SENSOR SIGNAL
59	T59 16PK	UNDERDRIVE SOLENOID CONTROL
60	T60 16BR	OVERDRIVE SOLENOID CONTROL



TRANSMISSION
RANGE SENSOR

TRANSMISSION RANGE SENSOR - LT. GREEN 10 WAY

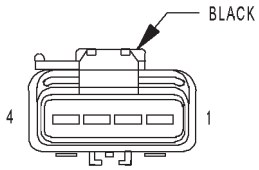
CAV	CIRCUIT	FUNCTION
1	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
2	-	-
3	T13 20DB/BK	SPEED SENSOR GROUND
4	T54 20VT/PK	TRANSMISSION TEMPERATURE
5	T41 20BK/WT	PARK/NEUTRAL POSITION SWITCH SENSE
6	L1 20VT/BK	BACK-UP LAMP SENSE
7	T1 20LG/BK	TRS T1 SENSE
8	T3 20VT	TRS T3 SENSE
9	T42 20VT/WT	TRS T42 SENSE
10	T41 20BR/YL	TRS T41 SENSE



TRANSMISSION
SOLENOID/PRESSURE
SWITCH ASSEMBLY

TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY - BLACK 8 WAY

CAV	CIRCUIT	FUNCTION
1	T50 16DG	LOW/REVERSE PRESSURE SWITCH SENSE
2	T9 16OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
3	T59 16PK	UNDERDRIVE SOLENOID CONTROL
4	T60 16BR	OVERDRIVE SOLENOID CONTROL
5	T47 16YL/BK	2-4 PRESSURE SWITCH SENSE
6	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
7	T19 16WT	2-4 SOLENOID CONTROL
8	T20 16LB	LOW/REVERSE SOLENOID CONTROL



VEHICLE SPEED
CONTROL SERVO

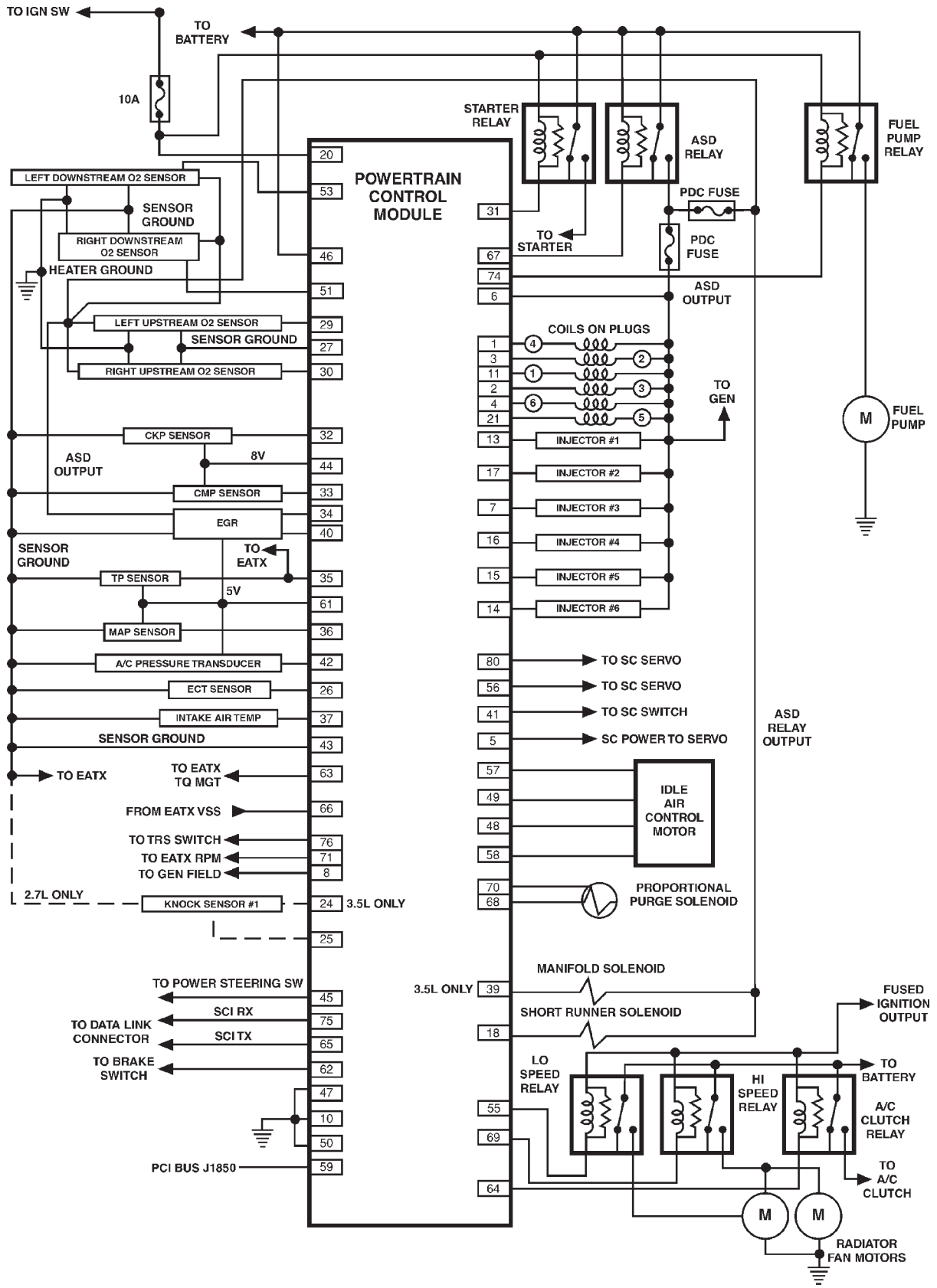
VEHICLE SPEED CONTROL SERVO - BLACK 4 WAY

CAV	CIRCUIT	FUNCTION
1	V36 20TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
3	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z1 20BK	GROUND

NOTES

10.0 SCHEMATIC DIAGRAMS

10.1 ENGINE CONTROLS (2000)



80b4fadc

NOTES